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ABSTRACT

These guidelines for school location planning (SLP) provide a methodology for countries borrowing from the World Bank for the purpose of expanding and improving their education systems. The discussion is presented in four major sections. In Section A SLP is defined more exactly, and examples are given to illustrate the range of situations in which it can make a major contribution. Sections B and C examine the complementary roles of national and local planning respectively. At the national scale the program ensures the establishment of a set of norms regarding schools and their location and allocates resource expenditures between local authorities. The local educational authorities then apply these norms to generate a rational school map. In the concluding Section D of the guidelines, these two major components are brought together in a discussion of a possible administrative and implementation structure. Appendices include a description of SLP in four recent World Bank financed projects, together with a review of the state of existing knowledge on the journey-to-school and its effects on attendance, dropout, and performance in primary schools. Sources of and job descriptions for technical assistance in this field are also given. (Author/MLF)

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GUIDELINES FOR SCHOOL LOCATION PLANNING

School Location Planning needs to be used in all countries as a continuous planning technique for ensuring a close relationship between the distribution of schools and the distribution of the population to be served by them - children of school-going age. These Guidelines provide a general methodology for School Location Planning in countries borrowing from the World Bank for educational development, and are aimed particularly at improving the access of disadvantaged groups, e.g. the rural poor, and at the more efficient distribution and utilization of inputs, including teachers and learning materials, as well as the school buildings themselves. The main functions of National Ministries of Education in this process are (a) in the setting of national norms on such variables as school and class size, pupil/teacher ratios, building requirements and costs; (b) in establishing the general relationship between the distribution of population and the schools and their catchment areas; and (c) in the identification of interregional variations in the quantity and quality of education and in planning to reduce or eliminate these variations. Within each major region several strategies for reaching areas currently beyond daily access to existing schools are identified, notably in the possibilities for flexibility in school sizes, as a result of the adoption of special measures, including multigrade teaching, biennial intakes, feeder schools, or double-shifting. The appropriate strategy will vary according to the educational and demographic circumstances of the area concerned - in sparsely populated, underserved rural areas there may be a need for more but smaller schools; in densely populated or urban areas rationalization of the existing system may be called for. An operational structure for the establishment and management of a National School Location Planning Program is proposed. Appendices include a description of School Location Planning in four recent World Bank financed projects, together with a review of the state of existing knowledge on the journey-to-school and its effects on attendance, drop-out and performance in primary schools in LDCs. Sources of and job descriptions for Technical Assistance in this field are also given.

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GUIDELINES FOR SCHOOL LOCATION PLANNING

Introduction and Summary

These guidelines for school location planning (referred to as SLP hereafter) have been compiled for the use of countries borrowing from the World Bank for the purpose of expanding and improving their education systems. They are designed to aid borrowers to establish and maintain programs that will ensure a more rational distribution of schools and other inputs into the educational system. Such a program can be a highly effective and fairly rapid means to improving its efficiency.

These guidelines are meant to be as non-technical as possible. Technical expertise appropriate to the country concerned can always be added at an appropriate stage by individual educational planners who have been involved elsewhere in this process or through specific training programs for local planners. However, these guidelines can benefit those governments and planners who do not yet have that expertise, but who seek a technique to ensure better and more successful implementation of national plans.

The aims of the World Bank in lending for educational development are to improve the quantity, quality, equity, and efficiency of education. Since SLP will assist borrowers in achieving these aims, the Bank is eager to support school location programs. However, SLP is something that ought to be done routinely by any country, and it is hoped that these guidelines will be used in their own right and not only in connection with Bank-financed projects.

It is inconceivable that a single set of guidelines could be equally applicable in all countries: to those near either end of the development continuum; to those with a population of less than 1/4 million and to countries with over 200 times that figure; to those with a unitary administrative structure and to those with a federal structure; to those with universal enrollments for 9 grades and to those where even in the first grade less than half the age group attend school. Nevertheless, the methodology presented here is sufficiently flexible to be adaptable to local needs and problems. Officials at all levels of educational administration can relate them to particular situations.

The discussion is presented in four major sections: In Section A SLP is defined more exactly, and examples are given to illustrate the range of situations in which it can make a major contribution. Sections B and C examine the complementary roles of national and local planning respectively. At the national scale the program ensures the establishment of a set of norms regarding schools and their location, and allocates resource expenditures between local authorities. The local educational authorities then apply these norms to generate a rational school map. In the concluding Section D of the guidelines, these two major components are brought together in discussion of a possible administrative and implementation structure.

SECTION A - WHAT IS SCHOOL LOCATION PLANNING?

1.01 School location planning is the term normally applied to the set of administrative policies and procedures that are used to plan the distribution, size and spacing of schools. Its primary aim is to match the distribution of schools (and, more particularly, the student spaces in those schools) to the distribution of the potential population to be served. On one hand, it plans the pattern of educational provision to allow more pupils to have easier access to schools, on the other it plans the pattern of educational provision to allow a more efficient use of current and additional resources.

1.02 School location planning is sometimes known as "school mapping", but it is more than simply compiling a map which shows the distribution of schools. Such a map is necessary in the process of identifying current inadequacies in distribution and to realize appropriate types and patterns of school provision. School location planning can be applied to all levels of education, from kindergartens to universities, but its greatest value is in the planning of primary and secondary education where regularity of access is an important feature. Many allusions to these two sub-sectors will be made in these guidelines. It also involves more than planning the location of schools themselves, but of all other inputs into the schools, such as learning materials and teachers, over which the planner has authority.

1.03 Educational planning has developed greatly over the last few decades, but its achievements have been in planning for a country as a whole. This may have been related to manpower planning or to maximizing aggregate returns on scarce financial inputs. In general, however, the individual parts of the whole, each school and the regional systems within a country, have been given less attention and as a result there has often been a failure to implement plans satisfactorily. Too little was known of the workings of the education system at the local level, and the details of how targets were to be achieved were often glossed over. School location planning can remedy some of the deficiencies of aggregate planning, by considering locations of individual schools on classrooms and other inputs, and aggregates upwards to rationalize the distribution pattern of student spaces and enrollments within and between local education authorities of any given country.

1.04 School location planning, like manpower planning, must be seen as a continuous process. There will inevitably be peaks in activity in this process, e.g. when grade structures are being reformed or when enrollments are being expanded rapidly. However, in the ordinary situation there ought to be continuous recording of the basic information required for analysis of the school map for any given point in time. This would necessitate a continuously updated inventory of facilities designed to answer the question, "what is where". In many countries the data that are routinely collected for educational planning pay insufficient attention to the actual location of resources.

Applications of School Location Planning

1.05 All countries and their educational authorities are concerned with the distribution of schools as part of their overall strategy of educational planning, though in many countries distributions emerge often more by accident than by design. Each country has its own particular school location problems, e.g. in USA the most important of these has been the design of catchment areas of urban schools to ensure racial balance; in UK, where there is a policy to end selective secondary education, the problem has been to identify the most suitable network of comprehensive secondary schools. The research project "Planning the location of schools" of the International Institute for Educational Planning, in a series of 12 case studies in countries diverse as West Germany, Nepal and Uganda, has identified a variety of situations where school mapping has been able to diagnose major problems and has developed a methodology to solve or alleviate these problems. 1/

1.06 The following are examples of situations in which sound school location planning would make a major contribution:

a) Expansion. A country wishes to expand enrollments in primary education to 75% of the age group within five years and to universal primary education (100%) within 10 years. At present overall enrollment ratios are 50% of the age group but this proportion varies considerably from region to region. Therefore, to achieve the targets expansion needs to be greater in some regions than in others. How should resources be allocated to minimize and eventually eliminate the disparity? How many new schools are needed to achieve the targets? Where should these new schools be located?

b) Restructuring. A country wishes to alter the structure of its educational system, e.g. from 6-3-3 to 4-4-4, partly to enlarge enrollment and improve retention in the first four-year cycle. This will necessitate most six-grade primary schools becoming four-grade primary schools and perhaps some others becoming four-grade middle schools. How can the pattern of provision be changed, given existing buildings, to ensure maximum initial access to primary schools and maximum subsequent access to middle schools? Where should any new schools be built?

c) Low pupil/teacher ratios. The per pupil costs of a school system are raised by low overall pupil/teacher ratios in primary schools, due primarily to under-enrollment in sparsely populated rural areas. How can the pupil/teacher ratio be raised and costs reduced in such areas without reducing accessibility to local children (e.g., by such measures as providing transport, boarding facilities or having variable size schools)?

e) Rural day secondary schools. A country is expanding its secondary school sub-sector rapidly enough to shift away from boarding schools to day schools, with lower unit costs. Therefore it needs to know where the majority of primary school leavers are, and then to select those boarding schools where at least some dormitory space can be converted into classroom/lab/workshop use. This may require new structures such as biennial intake (i.e. every second year) or groups of central and feeder schools. Which areas should adopt which solution?

f) Repeaters and dropouts. A country experiences wide disparity between districts in "internal efficiency" in the schools. For example, in some districts high repetition and dropout rates may require 12 school years of instruction to produce a graduate from, say, a five-year cycle, while other districts are close to the official norm. Would adding more student spaces in the inefficient districts be a good investment, or must simultaneous changes be made in raising the student flow rate, by a variety of structural, locational or curricular measures?

Equity and Efficiency

1.07 These and other issues arise out of two basic goals of all educational planning: that it shall promote equality; and that it shall promote efficiency. Systematic planning of the location of schools is vital in furthering equality of educational opportunity. It ensures a better distribution of schools so that no child is denied initial access to school, or is discouraged enough to dropout because his home is not within easy reach of a school. In many countries where there is not universal education home-school distance is a greater cause of unequal access - and, later on, of absenteeism and attrition - than is parental socio-economic status. School location planning is also a major vehicle for improving the efficiency of the system, both educationally and financially by improving pupil-teacher ratios, ensuring better use of space and lowering per pupil and per graduate costs. Any technique that can simultaneously pursue both equity and efficiency goals must be given a central role in educational planning.

Task Sharing

1.08 School location planning requires a degree of decentralization to bring local officials into decision-making. Because it is concerned with the location, size and spacing of individual schools, SLP must heavily involve the officials who deal directly with these schools. This does not mean an abdication of responsibility by central authorities, nor will it cause the disintegration of the national system. School location planning is done with central guidance to ensure national norms are maintained, but local officials should have considerable decision-making authority within these norms. The separate responsibilities of central and local officials and the links between them are the major components of the remainder of the guidelines.

SECTION B - THE ROLE OF CENTRAL AUTHORITIES

2.01 A National Ministry of Education has overall responsibility for providing an efficient education system. Its policy goals will often have a political and social content, e.g. fostering of a national ethos, the achievement of universal primary education by a given date. The educational provision that is planned will, therefore, seek to achieve these goals within the Ministry's budgetary constraints. Rational SLP must be a major part of this effort.

2.02 The direct responsibility of a National Ministry in the field of school location planning can be encompassed within four general areas:

- setting national norms for the sizes and costs of schools and classes, and for construction standards;
- ensuring the collection of adequate data for diagnosis of inadequacies of school provision, present and projected, through periodic facilities surveys and regular enrollment returns;
- relating patterns of school provision to present and projected national population and socio-economic distributions;
- allocation of resources between competing regional authorities.

2.03 Each of these areas of responsibility is considered below, and each will have a general applicability to all countries. However, particular problems arise in different contexts, and several of these are considered as special cases in subsequent paragraphs.

Setting the National Norms

2.04 Some of the norms to be established are so obvious that they need no detailed elaboration or justification, while others which are more specific to the needs of school location planning are not normally considered. As a result, practice and experience may vary greatly from one region to another or even from one school to another. National planning must seek to rationalize these experiences into a set of acceptable norms.

2.05 Education Structure: The length of schooling for each level in the system, 3-4-5, 4-4-4, 7-3-3 or whatever, and the length of compulsory schooling, cannot be established with the aid of SLP but are accepted as givens. However, changes in the structure, e.g. from a four-year primary system to a six-year primary system, will have important implications for planning a rational school map. To maximize access to and retention during basic education it is obviously preferable to have a short rather than a long first cycle, i.e. four years rather than six or seven, with equal opportunities for promotion to the next cycle on a merit basis.

2.06 Internal Efficiency of Schools: The purpose here is to raise the output or productivity of each student-space in a school, i.e. the "space productivity rate", by maximizing the number of graduates or completers of a cycle for each space available. 2/ Repeaters and both voluntary and involuntary dropouts are symptoms of inefficient use of scarce space, teacher, and budget resources. High repetition and dropout rates could be a result of unusually high academic standards in anticipation of rigorously competitive selection, but premature attrition in the mid-cycle grades is an economic and educational waste. Selection from one cycle to the next, however, may be justified as an economic necessity. National norms for tolerable repetition and dropout rates are necessary even if difficult to enforce. Areas where these norms are not met may require special monitoring if new spaces added are to be used to produce an expected rate of graduates.

2.07 School Size: Norms for school size will normally be fixed by the structure, e.g. length of a cycle. But the need for double-streaming in dense areas or, conversely, for having biennial intake or multi-grade classes in small schools in sparsely settled areas must be given serious consideration. The conditions under which these become the appropriate norm for areas of a country will be discussed below (paras. 3.15 - 3.25). Where appropriate, central authorities should be ready to encourage local officials in remoter areas to adopt smaller school units, and extreme cases as small as a single teacher/single room, providing these are the only means for extending educational opportunities into their regions without pushing up costs prohibitively.

2.08 Size Implications of Special School Subjects: Certain school subjects, such as industrial arts, require extra equipment, space, and specially trained staff. These, in turn, may increase the minimum size necessary for the school to be operated efficiently considering the cost of additional resources.

2.09 Class Size: Enrollment: This will be set to optimize the pupil/teacher ratio in the form of a maximum and a minimum class enrollment size. This range may not be the same for all grades, especially where schooling is not compulsory. Class enrollment in the first grade may be set at 45 but in the upper grades the acceptable norm may be 35. A complete six grade school may then have 240 pupils and a mean class size of 40. Since it is common for teachers' salaries to comprise 80-90% and exceptionally up to 95% of primary school recurrent costs, it is vital that class sizes remain as near the norms as possible. Where class sizes, especially in the upper primary grades, have fallen below acceptable levels as they have in many countries, structural changes such as biennial intake, multigrade teaching or nuclear-satellite local school networks may be needed.

2.10 Class Size: Space: The need for a norm for class enrollment size is closely related to the need for a norm for classroom area or space. Once built, the space, if too small, may place an uneconomic constraint on enrollment size and, in turn, the pupil-teacher ratio. The creation of student spaces in classrooms may be the most expensive type of capital unit cost going into educational expansion. Considering this, school location planning should be seen as the rational method of locating new student spaces since these are the concrete units for resource investment. The spaces are of course normally grouped into classrooms which are "packaged" into schools. Thus a norm for optimum classroom enrollment must go hand-in-hand with a norm for per-student floor space or area; together they will determine the norm for classroom floor space or area. Where there is to be flexibility in class and school enrollment sizes, i.e. in those areas of low enrollments, the classroom area will need to be variable, such that the whole school area may be subdivided by the flexible partition arrangements into individual class areas.

2.11 Construction Norms: These will depend on the type and level of education, and may vary regionally, e.g. urban building standards are generally more stringent than rural. The most appropriate building materials in terms of climate, availability and cost may vary from one region to another. Space-consuming equipment affects per-student space and classroom area.

2.12 Capital and Recurrent Unit Cost Norms: Unit costs are determined by many factors. Nevertheless, a range of tolerable unit costs is needed as a norm to ensure meeting educational expansion targets within budgetary limits. In situations of extreme variation in climate, in access to building materials and building workers, the capital unit costs will vary between areas. However, experience has shown that the "local cost factor" is often impossible to predict with any reliability until construction is actually beginning. The vagaries of weather, inflation, construction market competition, discoveries of resources, volunteer labor, and even the fluctuating number of new schools which might be built can all affect costs.

2.13 Variation in recurrent unit costs is most heavily influenced by pupil/teacher ratio, boarding considerations or the composition of the teaching staff. Areas which have low pupil/teacher ratios tend to have higher recurrent unit costs since salaries are so large a part of that cost. Here, too, the influence of other hard-to-predict intervening factors make predicting a local cost factor difficult.

2.14 The result of these problems has been the reliance on aggregated national averages in planning unit costs. Therefore, we return, by default, to the importance of having national unit cost norms - but in a range to account for local cost variations.

Population Requirements for Locating New Schools

2.15 Threshold Population: Schools and classes cannot be provided everywhere. The threshold population is the minimum total population sufficient to establish a school - and any classroom in any school - with the minimum acceptable capacity in terms of student spaces or potential enrollment. If, for example a primary school has a six-grade capacity of 240 (6 classes of 40 student spaces), if the national primary school age population is 15% of the total population, and there is a 100% enrollment rate, the threshold population for the school would be 1600 (i.e. 240 ÷ 15%).

If 15% of T = 240

$$\text{then } T = \frac{240}{.15} = 1600$$

Where T is the threshold population

In order to have a school with 240 pupils there must be a total population in the area of 1600. If, however, the target enrollment ratio is 75% of the primary school age group, the threshold population will be higher since 320 people of school age will be needed to have 240 of them in school, and the threshold population would rise to 2133 $\left(\frac{40 \times 6}{.15 \times .75}\right)$

2.16 Generally, $T = \frac{s \times c}{a \times e}$

Where T = threshold population (total)
s = class size
c = number of classes per school
a = relevant age group as a percentage of total population
e = target enrollment rate

Of course a six-year age group percentage must be used when calculating the threshold population of a six grade school. By the same token, only a single year age group is necessary when computing the threshold for a single grade. Following the case above the threshold would still come to 2133 $\left(\frac{40 \times 1}{.025 \times .75}\right)$

2.17 Range: This is the maximum distance children are expected to travel to school each day. In most countries this must be assumed to be the walking distance from home to school, though the bicycle may become important in the secondary grades in some countries. Cases of children walking very long distances, perhaps 10 kilometers or more in each direction each day, are certainly known, but most children will walk only 1 or 2 km to school. As mentioned before excessive distance between home and school is sometimes the key factor in reducing access and increasing absenteeism, and thereby performance. The mean distance that children walk must be mininmized, and no child should be expected to walk more than the range. This distance will vary from country to country, and even within a country the range norm can vary. In hilly areas, for example, the range may be less than in flat areas, given the relative difficulty of travelling any given distance. However, in no circumstance can the range be set at more than 5 km (or approximately one hour walking time) even for secondary school pupils, and should be 2 or 3 km for the youngest school children.

2.18 **Interaction of Threshold and Range**: The interaction of threshold and range norms is at the heart of school mapping. The critical question is: is the threshold population achieved within the range? Continuing the previous example, if the range norm is established at 3 km, and assuming no barriers to movements such as a river or hill, there will be round the school a circular catchment area of 28.28 km^2 (or $\pi r^2 = 3.142 \times 3$ km^2). There will be a total population of 2133 in this catchment area where population density exceeds 75 per square kilometer (2133 ÷ 28.28 = 75.4). Therefore in all areas where total population density exceeds 75 p.s.k. the threshold population required for a 240 space, six grade school is reached if the target enrollment rate is 75% (and the six-year age group constitutes 15% of total population), and a primary school can operate to capacity, i.e. with acceptable levels of enrollment. If, however, in any area with this age-profile the population density is less than 75 p.s.k. the threshold population will not be reached within the range. Therefore, in order for a primary school to operate up to capacity in such an area, one or more of the norms need to be adjusted: either (a) extend the range to 4 or 5 km to serve more people; (b) reduce the threshold population required by having smaller schools; or (c) raise the target enrollment rate.

2.19 Part of the national effort in SLP should be to prepare a set of tables in which these norms are allowed to vary within acceptable limits, and the threshold population densities are identified as the norms vary. In Tables 1, 2, and 3, for example, enrollment rates vary within each table. School size norms change from one table to another. Within each table, two range options are compared for each set of enrollment ratios. In Table 1, a one-stream school is assumed; in Table 2 a two-stream school is assumed; in Table 3 half stream intakes are assumed - which is the practical result of biennial intake or moderate multigrade teaching. The implications of tables are more clearly seen when the data are presented graphically. *The higher the enrollment rate and the larger the range, the lower the threshold population density needs to be.* Raising enrollment rates will also be a major route to achieving satisfactory threshold conditions.

2.20 Preparation of tables and graphs such as these will i) have a general application in the country as a whole; and (ii) be used by local authorities for more detailed analysis of school locations to be discussed in Section C.

TABLE 1

Single Stream 6 Grade School

Table of Threshold Population Densities for 5 or 2.5 km. Ranges

(Six Year School Age Group is 16% of Total Population)

a. Class Size = 40 spaces (average).
b. School Size = 6 grades, single stream = 240 spaces

Enrollment Rate (e) %	Enrolment Rate Multiplied by .16*	Threshold Total Population (t)	Population Density Threshold(d) with Catchment Areas (k) of:	
			78.55 km^2 (5 km. radius) (d)	28.28 km^2 (3 km. radius) (d)
100	.160	1500	19 p.s.k.	53 p.s.k.
90	.144	1667	21	59
80	.128	1875	24	66
70	.112	2143	27	76
60	.096	2500	32	88
50	.080	3000	38	106
40	.064	3750	48	133
30	.048	5000	64	177
20	.032	7500	95	265
10	.016	15,000	190	530

* Refer to formula for computing threshold populations in para. 2.16.

FIGURE 1
(ACCOMPANYING TABLE 1)
SINGLE STREAM SCHOOL
(240 Spaces; 6 Grades)
INTERACTION OF RANGE, ENROLLMENT RATE
AND POPULATION DENSITY THRESHOLD

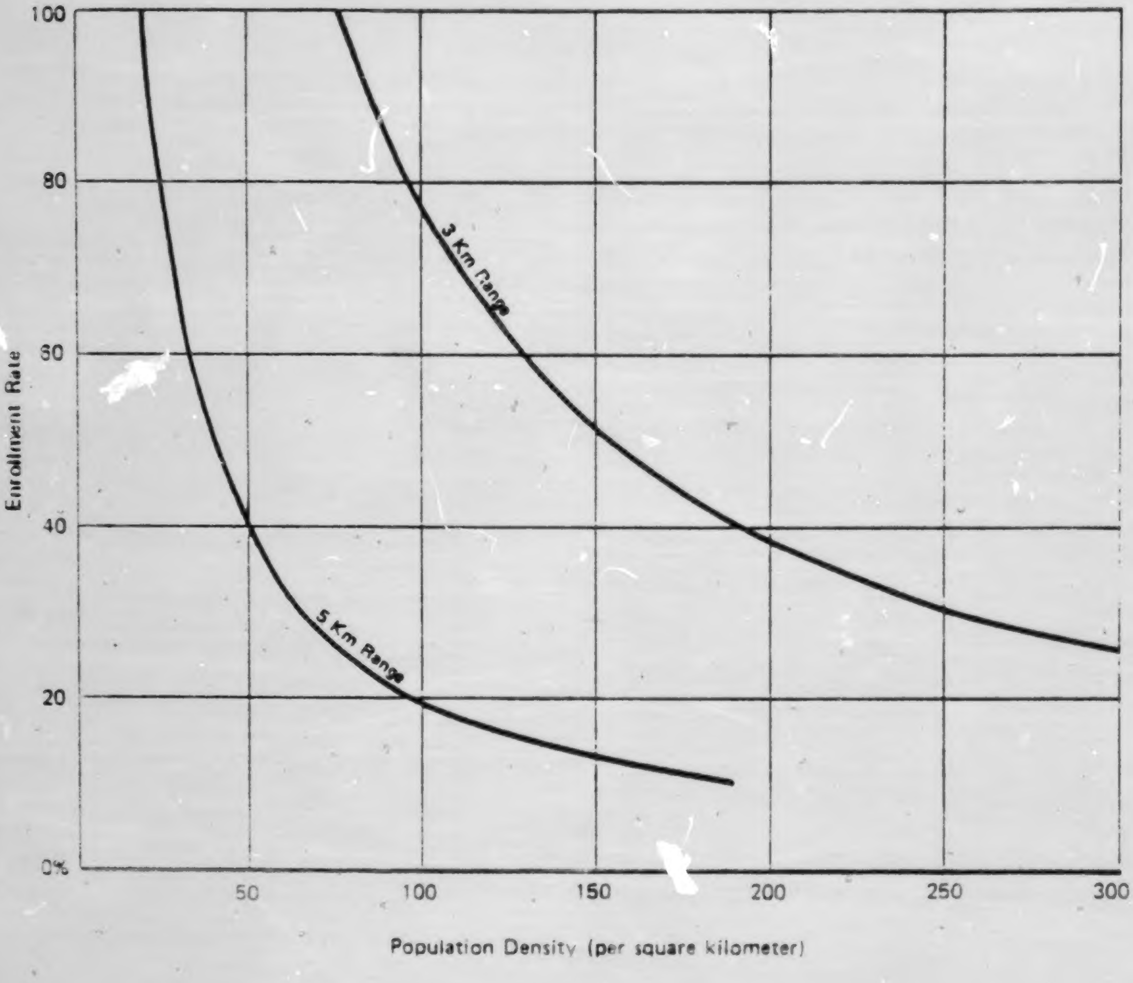

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TABLE 2

Double Stream 6 Grade School

Table of Threshold Population Densities for 5 or 3 km. Ranges

(Six Year School Age Group is 16% of Total Population)

a. Class Size = 40 spaces x 2 streams = 80 spaces per grade.
b. School Size = 6 grades x 2 = 12 classes = 480 spaces.

Enrollment Rate (e)	Enrollment Rate Multiplied by .16*	Threshold Total Population (t)	Population Density Threshold(d) with Catchment Areas (k) of:	
			78.55 km^2 (5 km. range) (d)	28.28 km^2 (3 km. range) (d)
100	.16	3000	38 p.s.k.	106 p.s.k.
90	.144	3333	42	118
80	.128	3750	48	133
70	.112	4285	55	152
60	.096	5000	64	177
50	.080	6000	76	212

* Refer to formula for computing threshold populations in para. 2.16.

FIGURE 2
(ACCOMPANYING TABLE 2)
DOUBLE STREAM SCHOOL
(480 Spaces; 6 Grades)
INTERACTION OF RANGE, ENROLLMENT RATES
AND POPULATION DENSITY THRESHOLDS

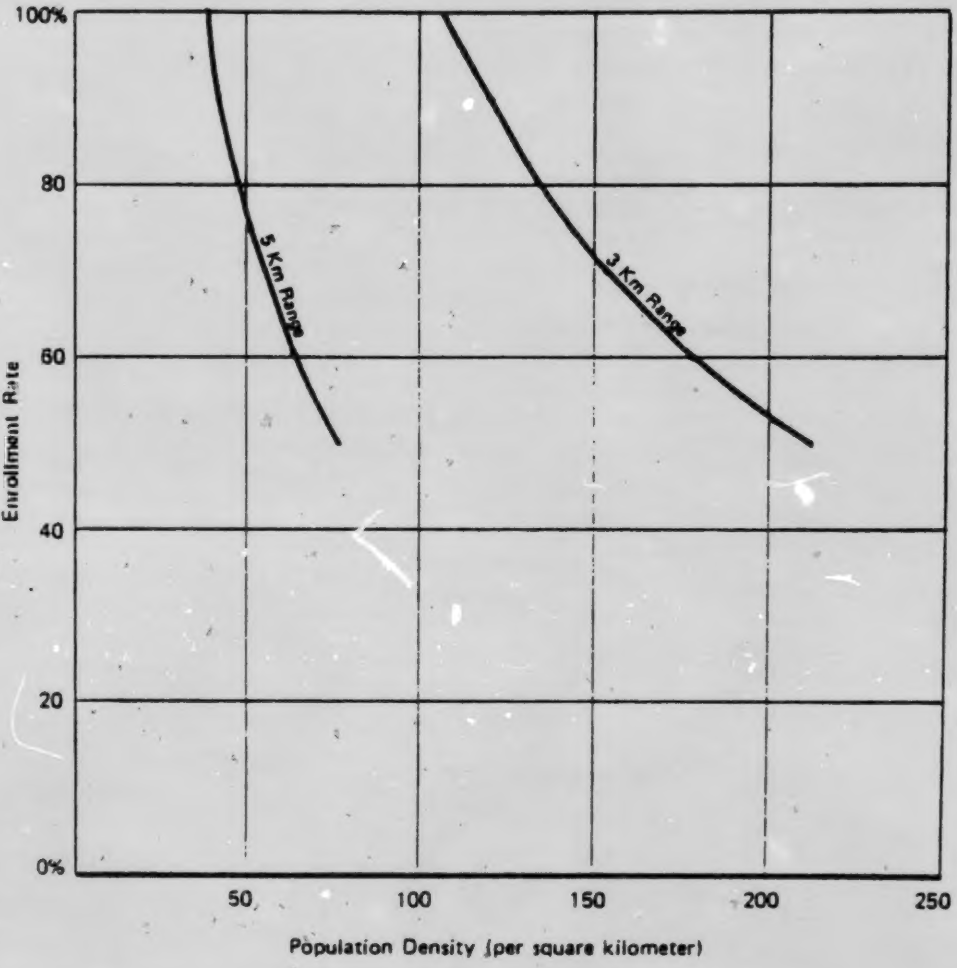

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TABLE 3

A. Half-Stream 6 Grade School

Table of Threshold Population Densities for 5 and 4 km. Ranges

(Six Year School Age Group is 16% of Total Population)

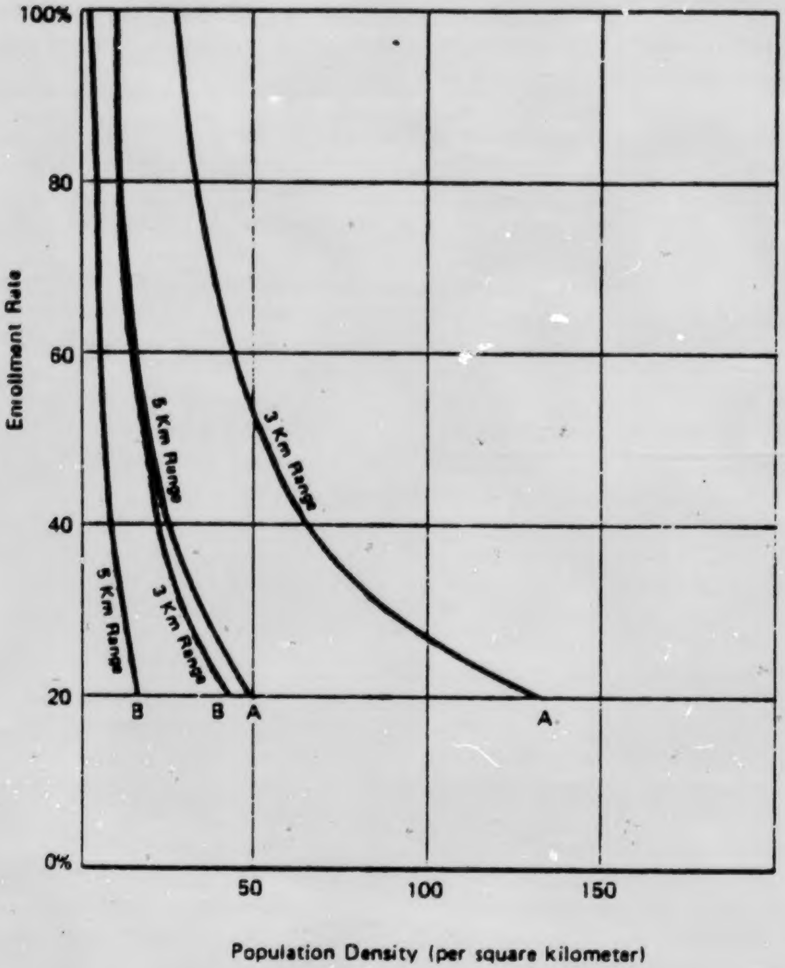
a. Classroom Size = 40 spaces average; 3 classrooms.
b. School Size: 6 grades of 20 students, combined in 3 multigrade classrooms = 120 spaces.
OR
c. School Size: 3 grades of 40 students from biennial intake = 120 spaces.

Enrollment Rate (a)	Enrollment Rate Multiplied by .16*	Threshold Total Population (t)	Population Density Threshold(d) With Catchment Areas (k) of: 78.55 km.^{2} (5 km. range) (d)	28.28 km.^{2} (3 km. range) (d)
100	.16	750	10 p.s.k.	27 p.s.k.
80	.128	937	12	33
60	.096	1250	16	44
40	.064	1875	24	66
20	.032	3750	48	133

B. One-Room School for 6 grades, 40 spaces.

100	.16	250	3	9
80	.128	312	4	11
60	.096	416	5	15
40	.064	625	8	22
20	.032	1250	16	44

FIGURE 3
(ACCOMPANYING TABLE 3)
A. HALF STREAM SCHOOL
(120 Spaces; 6 Grades)
B. ONE-ROOM SCHOOL
(40 Spaces; 6 Grades)
INTERACTION OF RANGE, ENROLLMENT RATES
AND POPULATION DENSITY THRESHOLDS



World Bank–17062

The Data Base

2.21 Education data: The central authorities usually determine the kinds of data to be collected, analyzed and published by the various levels of the hierarchy. These are the data collected in the annual statistical report for each school, but these data very often omit elements that are fundamental to SLP. It is necessary to have data that will identify certain aspects of the geographical distribution of schools, site and catchment area conditions for these schools, and the size of the existing school plant. Specifically, data collection procedures for individual schools must include:

a) exact location, (identified if possible by grid reference), or a verbal description of location such that the school can be located exactly on a map; distance from nearest road; distance from nearest town or social service center;

b) nature of catchment area (e.g. relief, barriers to movement, predominant economic activity, area of inmigration or population decline);

c) the number of student spaces available in each grade, and an indication of the state of buildings to identify if replacement of space facilities is necessary. Table 4 is a sample form for a student-space inventory.

These data do not vary significantly from year to year, if at all, and should be available from a periodic inventory of physical facilities done every four or five years.

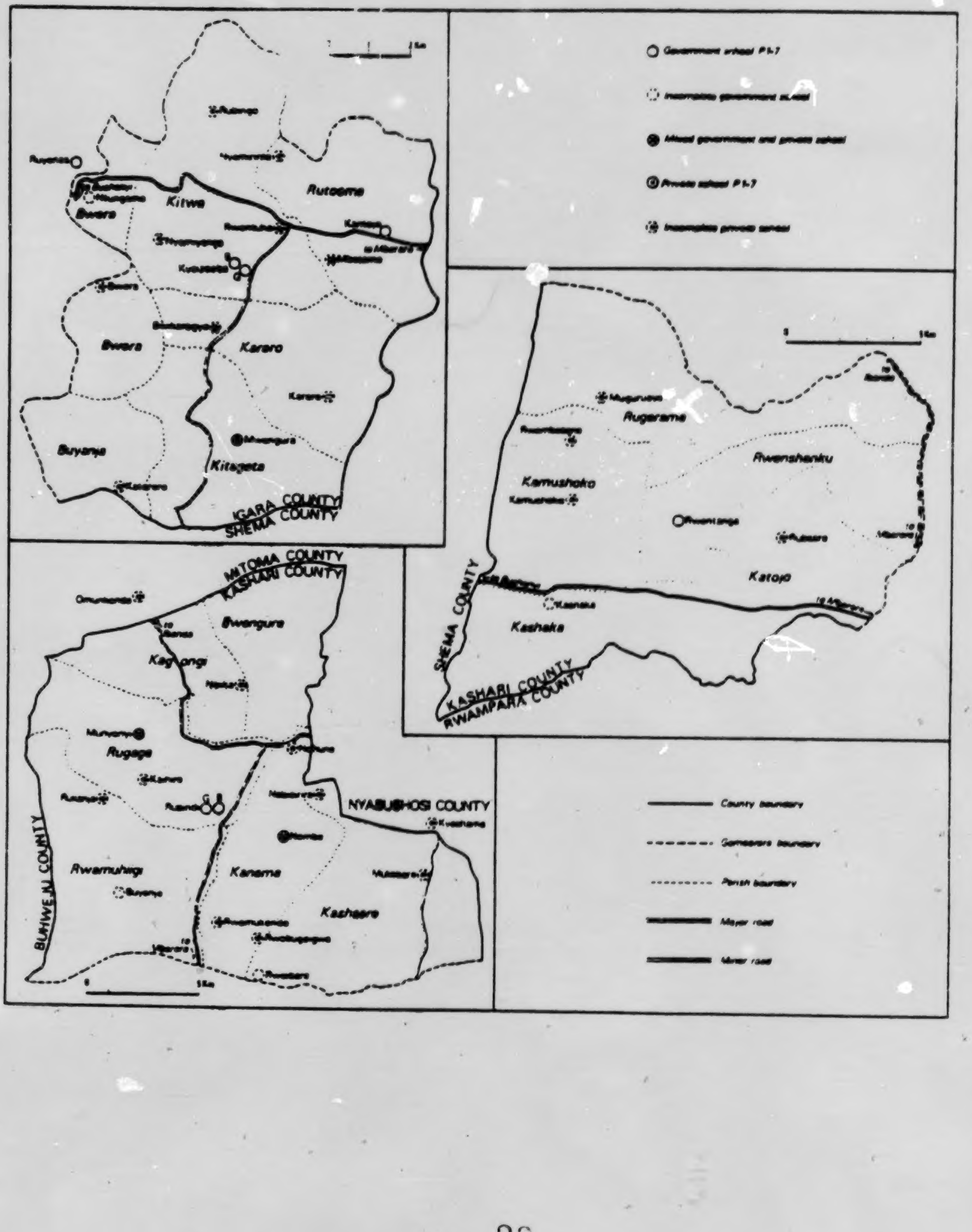
2.22 Population data: All educational planning requires population data. Traditionally the main use of census sources has been to make demand projections based on existing rates of population growth and on the age distribution. These projections were made at least for the country as a whole but also in most cases taking migration between the main regions into account. SLP will also use these data, but will require further analysis of the census, particularly of the geographical distribution of population at the local level, where migration is likely to be a much more significant proportion of total population change than it is at the national or even regional level. The Ministry of Education must have strong links with the census authorities to ensure that the most up-to-date population and migration data are available to central and local officers. In some countries where population registration systems have been established the data that may be derived are even more valuable than census data at the local level for SLP, especially in their estimation of school-age populations. While these data will be of particular value to local officials, their availability in a useable form may need to be established at Ministerial level.

2.23 Other Planning Data: General rural and urban development policies must also be considered. In some countries policies have aimed to provide social facilities including schools, health centres, cattle dips, etc., at central points to encourage nucleation of population at these points. In such a situation schools cannot be located separately from the other facilities. In other countries resettlement projects may induce major changes in the distribution of population, and school provision should anticipate such changes. Obviously, school mapping programs must take these larger policies into account, at both the national and local level. SLP, to a much greater extent than other aspects of educational planning, must take account of and be involved with government agencies outside the Ministry of Education.

2.24 Maps: Although school mapping is much more than the production of the map showing the distribution of schools, this is an essential first step. Maps will be made both centrally, especially for upper-level schools, and locally, especially for primary schools. For this purpose it may be possible to use specialist draftsmen in the Ministry or in the Government's Mapping or Survey Service, but at the local level the basic work for a manuscript map will often be drafted by regional officials with no particular cartographic skills. For this reason, assistance must be given and norms established to assist local officials and ensure comparability of the maps produced.

a) Base Maps: Each local education authority should be provided with large base maps of their area on which the school distribution can subsequently be shown. They will be derived from the general topographic maps of the country and should identify the main roads, the boundaries of lesser administrative areas, main rivers, main mountain ranges or hills. They should have a scale. For the mapping of primary schools a scale of 1:50,000 or 1:100,000 is usually appropriate for most rural areas. In towns 1:10,000 will be necessary.

b) Symbols: There should be a standard set of symbols to ensure comparability. For example, IIEP uses a basic twofold distinction between circles for primary schools and diamonds for secondary schools, and each of these can have several variants according to the needs of the country concerned. The sample maps shown in Map 1 illustrate various types of symbols possible.


Rutoома
Kitwa
Bwera
Rutooma
Bwera
Karoro
Buyanja
Kitagata
IGARA COUNTY
SHEMA COUNTY
Government school P1-7
Incomplete government school
Mixed government and private school
Private school P1-7
Incomplete private school
Rugarama
Rwenshanku
Kamushoko
Katojo
Kashaka
SHEMA COUNTY
KASHARI COUNTY
RWAMPARA COUNTY
MITOMA COUNTY
KASHARI COUNTY
Bwengure
Kagongi
Rugaga
NYABUSHOSI COUNTY
Rwamuhigi
Kanoma
Kashaare
BUHWEJU COUNTY
County boundary
Gombolola boundary
Parish boundary
Major road
Minor road

Identification of Regional Opportunity Differences

2.25 In addition to the establishment of norms, central authorities must pursue certain diagnostic and analytical functions. These involve identifying variations between regions as a first step towards reducing or eliminating them.

2.26 The kind of inter-regional comparisons required are of those indices normally done for the entire system, e.g., enrollment rates, dropout and repeater rates, pupil/teacher ratios and expenditures per pupil. Comparison of regional indices will identify those areas where i) the educational system is most or least efficient; and ii) the national norms are not being met. It is to areas of lowest enrollment and highest dropout rates that particular attention must be paid to quickly identify the causes of the poor performance.

2.27 The problem is likely to arise most markedly with variations in enrollment rates, and particularly in the enrollment rate in grade I. In countries where attendance at school is neither universal nor compulsory, there can be large regional variations in the proportion of children of school age who attend school. These variations arise as a result of various factors, but generally enrollment rates are low in sparsely populated and low income areas, in areas remote from the national capital, or where the local community is minority group. Steps can be taken to reduce these differences by allocating a disproportionately large number of school places and of resources generally in order to narrow the gap between advanced and backward regions.

2.28 In a certain country, for example, it is planned to expand primary school enrollments to achieve a new national target enrollment rate. In order to reduce existing disparities in regional enrollment rates, the following steps are required. If data permit this can be done for each grade; otherwise, for the complete cycle.

a) Calculate the present "space provision rate" (number of student spaces measured in area, divided by age group population, region by region) or enrollment rate (enrollment divided by population in age group for each region). The space provision rate is the basic index of resource disparity. However, enrollment can and often has to be used as a close substitute index if information on space is unavailable.

b) Set target space provision or enrollment rates for each region, after projecting current population and possibly enrollment amounts forward to a target year. (Targets may be the same in each region if absolute equality is required, in the extreme case 100% with universal primary education. More realistically, in countries with existing variations, disparities cannot be eliminated immediately and it may be necessary to aim in the first instance at narrowing the gap rather than closing it altogether.)

c) Calculate target numbers of spaces or enrollments for each region. (This equals number in the relevant age group times target space provision or enrollment rate.)

d) Calculate the difference between the current and projected target enrollments. This will be the number of additional student spaces required to meet the target enrollment.

e) Calculate the number of additional schools or classrooms required to meet the target space provision or enrollment for each region. This will be obtained by dividing the number of additional spaces (in (d) above) by the school or class size norm established previously. Relatively more schools will be allocated to those regions with presently low enrollment rates.

2.29 In countries where there is universal education there will be regional parity in space provision and enrollment rates (at 100%) for that part of the cycle which is universal. However, it is likely that variation in qualitative indices (pupil/teacher ratios, expenditures per pupil, amount of learning materials) will remain. Planners are normally able to reallocate existing resources, or at least to allocate new resources to help redress existing imbalances. Where the various inputs are allocated centrally, new allocations should be made on the basis of an analysis of current qualitative indices, and not on the basis of expenditures in the previous year, for it is evident that previous allocations have not been able to provide equality in these indices. Where the local authority has responsibility for the generation and provision of resources poor regions will obviously be less able than richer regions to allocate adequate expenditures per pupil. In such situations equality of opportunity would be served by the allocation of equalization funds by the central government to raise total expenditure in the region up to an appropriate level.

2.30 By these steps the regional allocation of the additional resources can be ascertained. It will then be known that in a given region the allocated number of classrooms/schools need to be built or other improvements made. It will be the responsibility of school location planning done at the regional level to identify the areas within each region where schools can be located and those existing schools which need to be improved.

Special Problems

2.31 The issues raised in the following paragraphs are not equally applicable in every country. It is therefore appropriate to consider them separately as particular problems to be faced by some national educational planning authorities.

2.32 Social Divisions: Previous discussion has assumed a homogenous social structure, with all schools being accessible to all children within their catchment areas and that children attend the school nearest their home. The only factor to be considered in the distribution of schools is the distribution of the total population. However, in many countries the social structure is far from homogenous and separate public school systems have developed to serve different social categories. In practice, if not in theory, school catchment areas are differentiated socially as well as spatially, and this division may be separate schools for adherents of different religious or denominational groups; in a few countries racial divisions are still maintained in the school system; in others linguistic or sexual divisions operate.

2.33 The problem as far as SLP is concerned is that socially-based catchment areas represent a major irrationality, for threshold populations for each school will have to be considerably higher to fill two or more segregated schools where otherwise one integrated school would be adequate. If separate schools for boys and girls are provided in the same area this will have the same aggregate effect of double-streaming and threshold will be doubled. If there is a three-way split between religious groups forming 50%, 30% and 20% of the population respectively, the threshold population for a school for the minority group will be so high that it will normally be reached within the range only in urban areas. Social differentiation of catchments is certainly more prevalent in urban than in rural areas, but even there it necessitates longer travel distances than are strictly necessary.

2.34 In some countries this social differentiation may be further institutionalized with separate authorities planning for each social category. Schools may be located very near each other, but with no formal contact between them, while other areas remain unserved. Although such a situation is clearly inappropriate, it is often nearly impossible to abolish socially-based school systems without provoking considerable unrest. Such a step would be a major policy change, having implications beyond the development of a rational school map. However, planners should be aware that segregated, parallel systems universally operate against the poor, and strategies that seek directly to reach the poor, as is at the heart of the policies of the World Bank, should seek to move the system in the direction of universal admissions criteria in public schools.

2.35 Private Schools: In most countries a private sector exists alongside the public sector. The private sector will normally be one of two strongly contrasted types:

a) High quality schools serving the elite and the wealthy, and deriving an income from high fees to maintain a reputation above that of the public schools. These can exist in countries where there is universal education and in countries where there is not universal education.

b) Low quality schools, serving those who cannot find a place in a numerically confined public sector. These schools may either be in areas where there is no public provision or where public provision does not meet the local demand for education. They may have been founded by parents groups or by individual entrepreneurs.

Where there is universal education the integration of elite private schools into the public sector is very much a matter of political decision, concerning the rights of parents, and generally rich parents, to choose and pay for a better education than is provided in public schools. Where education is not universal, the issue for a school mapping program at the national level is to identify the extent to which the incorporation of private schools into the public sector represents a rationalization of the school map.

2.36 The general trend is to incorporate both elite and poor private schools into the public sector. This is done principally for political reasons, but in many cases it will represent a real improvement in the school map. This is obviously so in the case of schools operated by parents or local groups in unserved or underserved areas. These areas will tend to be in the poorest areas of a country, where overall enrollment levels are low, and public support should be extended where possible to such schools. In some instances they may be among the urban poor, for whom access to existing public schools may be a serious problem. Here also is a rational addition to overall supply. Such schools do promote equality of opportunity even though qualitatively the education provided needs to be raised to the level of the public system. This can be done by the allocation of qualified teachers and additional resources to upgrade the schools.

2.37 Some private schools make no valuable contribution to the school map, except to provide a net addition to total supply. High quality, elite private schools tend to be in urban or periurban areas alongside public schools, and their continuing existence is more a matter of political decision than of school mapping. Private schools run by individuals tend to be in urban areas, and can even be positively detrimental to the school map, for by providing additional capacity in urban areas they boost the migration of pupils, especially at secondary level, into towns to seek a place in school. This results in a gross mismatching of supply and demand. Therefore, measures to restrict the operation of private schools to rural areas may be contemplated.

2.38 Lack of Demand and the Equity-Efficiency Tradeoff: Previous discussion has been based on the premise that low enrollment rates are caused by a short supply of student spaces, that providing more schools, i.e. spaces, and other inputs in suitable locations would raise enrollment rates. But a lack of demand even within the range of a school may also cause low enrollment rates, and after adjusting supply, planners may find that students are not being enrolled as much in some areas as in others. For social or economic reasons some groups may feel apathetic towards the education that is being provided or not consider it worth the opportunity costs involved. By having a more appropriate distribution of schools the school map may reduce some of the effects of this type of response but cannot eliminate it.

2.39 In areas where there is manifest antipathy to schooling it may be necessary to introduce special types of schools to ensure that the institution is appropriate to the society concerned. For pastoralist groups, for example, it may be appropriate to have mobile schools where the teacher goes with the economic group as it moves with its animals to seek fresh pasture. The school moves to the pupils and not the pupils to the school. National policy norms should be formulated to deal with such a situation, though their implementation and detailed design would be the responsibility of local officials who deal directly with the group in question.

2.40 In such situations, where the effective demand for and use of schools is so low that extra inducements (e.g. specific vocational programs, free meals), investments or costs are needed to create student spaces, planning officials will have to face squarely a trade-off between equity and efficiency. As long as the new spaces provided are assured of a reciprocal increase in enrollments, school location techniques normally can balance the twin goals; hence its special attractiveness. But when it becomes possible that for the same investment one can create, say, twice as many new spaces for area or group "x", who are sure to use the added resource fully, as for group or area "y" who likely will not, then it becomes a real question whether it is even more equitable to choose the latter just because they are "behind". SLP techniques are insufficient guides for choosing which policy to follow here.

SECTION C - THE ROLE OF LOCAL OFFICIALS

3.01 Ministries of Education are organized hierarchically, the number of levels varying with the size of the country and the overall administrative structure. At the lowest level of the hierarchy there is an office of the Ministry or of local Government whose principal function is to provide a direct link between the Ministry and some or all of the schools in its designated area. This designated area should normally be a unit of general administration, a county or district, and its area of jurisdiction should be similar to areas of local responsibility in other sectors, e.g. health, rural development. By the same token boundaries of neighbouring education districts should not overlap. Where they do overlap, either through historical accident or administrative decision, this situation should be reversed as soon as possible, for if two authorities are competing or double counting within the same area then rational planning is severely hampered.

3.02 The traditional function of local education officials in developing countries has been largely administrative and supervisory, applying the norms and plans of the central administration. In many cases they have no local financial control or money raising powers, and are entirely dependent on the Ministry for a block grant with which to administer the system in their area. Furthermore, in many countries they have jurisdiction over primary schools only, other higher institutions being directly administered at provincial or national level. However, in a national school location planning program the diagnostic and executive capability of the local education office and officials is vital to the effective rationalization of the school map.

Application of Norms

3.03 The Ministry of Education will require any local office to ensure that the overall norms established by the Ministry, and discussed above (paras. 2.04-2.24), are being applied. On some aspects, such as having a given sequence of grade cycles, there will normally be no difficulty, though some schools will remain with less than a full cycle, i.e. as incomplete schools. Other norms, such as class size, pupil/teacher ratio, building standards, etc. may vary, sometimes beyond the limits set; perhaps for reasons not envisaged when the norms were being drawn up (e.g. low pupil/teacher ratios increases of very low population densities: see below, para. 3.20).

3.04 Any deviation from the norms can be identified in the data that are normally collected in the annual statistical returns for each school. They are aggregated in the local office to provide a statistical summary of the schools system in the area. These data, in raw form and in summary aggregate tables, will then be forwarded to the Ministry, and further manipulated there to give regional dropout or repeater rates or other, more complex indices, as well as providing the input for further aggregation to national statistics.

3.05 The most important use for SLP purposes of the data that are collected is the compilation of a map describing the distribution of schools, following the advice for maps given by the Ministry (para. 2.24). This should be on as large a scale as possible, such that individual schools can be located exactly (except perhaps within urban areas of a large region). The compilation of this map is made easier by the incorporation of geographical information provided from a central office, but may have been possible in any case, given the knowledge of the local officials, particularly the inspectors, of each school and its location.

Identifying Inadequacies in the Existing School Map

3.06 The production of an actual map showing the distribution of existing schools in each school district is a major step in the whole school mapping program but is simply the first step in the process of achieving a better spatial distribution of schools. The map is to be used along with other data to identify certain aspects of the inadequacies in the system. These inadequacies are also two distinct scales - those relating to individual schools and those relating to patterns of provision in general.

3.07 Inadequacies in Individual Schools: These will in many cases be identified when the annual data returns for each school are being analyzed. Then such features as abnormally high or abnormally low pupil/teacher ratios, undersized class, under-used classrooms or unacceptable dropout rates, etc., will be noted. In addition the general non-variable data as collected on location, site, etc. in the periodic school facilities inventory (para 2.21) will provide much of the background data. When these schools are identified on the school map, some reasons for these may be immediately apparent, e.g. if two schools are within 1 km of each other and class sizes in each are small, this would suggest that the competition for pupils between the schools is such that both operate with low pupil/teacher ratios and considerable under-used capacity. One school in the area would be adequate for the threshold population density to be reached at the prevailing enrollment rate. Two schools represent an overcapacity. Only when individual schools can be related to each other and to the catchment areas they serve can this type of inefficiency be identified.

3.08 Qualitative inadequacies may also be noted when the spatial patterning of schools is analyzed. If buildings are unsafe or unusable for good teaching methods, then these facilities may have to be discounted and replaced. Such things as the skewed distribution of highly qualified teachers or of equipment can be a useful indicator here. Highly qualified teachers may tend to be concentrated in more accessible locations, and poor equipment in least accessible locations. Authorities may wish to delibertately alter these distributions to seek a more even distribution of quality inputs.

3.09 Inadequacies in Spatial Patterns: The overall pattern of the distribution of schools and how this pattern relates to the region it seeks to serve need to be examined. First, the map helps to clearly identify those parts of the region presently unserved by schools. The school catchment areas, as defined by the range norm ought also to be drawn on the map, and the areas beyond the range are unserved. This should also be done for particular grades, e.g. some areas will be within the range of a complete school, while other areas will be found to be within range of schools with lower grades only, i.e. incomplete schools.

3.10 Local officials need to use detailed data on population distributions and densities, to examine whether threshold conditions be met within the range. A general survey of those tables and graphs which deal with population and enrollment conditions similar to those prevailing is a prerequisite for identification of specific irrationalities in the present school map.

3.11 Enrollment rates will also fall into a geographical pattern within the region. These rates will be ascertained by dividing total enrollment or capacity in each sub-region by the school-age population of that sub-region. It is often the case that the amount of variation within each local education jurisdiction or region will be greater than the variation between the various regions, in which case the need for the calculation of local indices of variation and their use in allocating additional resources is even more evident then it is at the national level.

Remedying the Inadequacies

3.12 Schools should be provided such that children living in all parts of a region can have daily access to them. The size of school should be related to the number of people within the school's catchment area, and enrollment rates should be equal (or nearly so) from one part of the region to another. These three aspects of the patterns of educational provision help identify inadequacies in the system which planners must seek to overcome. Planning will then seek to rationalize the map for some target date to make it more acceptable in improving access to the system and perhaps also in reducing per capita cost where initial access is already adequate. In this section there is a fairly brief comment on some of the general issues that SLP can be expected to consider at this level. More detailed discussions of several issues, some of which will be highly relevant in one situation but not in others, are contained in the following section.

3.13 Expanding the System: If school location planning is done prior to or in conjunction with an overall expansion of the system in any region, the expansion could be differential, directed towards areas presently under-provided. If, following in the calculation of regional allocations of new schools outlined above (Section B) the region in question were to receive a given number of new school places, it would be able, on the basis of the diagnosis of the existing school map, to allocate these new student spaces within the region to improve the existing pattern of supply.

3.14 Empty Areas: Some form of provision needs to be provided for children in areas presently beyond the range of a school. It may be that there are no people, or at least very few, in that particular area, or it may be that for some historical or political reason a school has not been built there. If there are no children, there is no problem. If there are very few, it may be possible to make arrangements on an individual basis to provide accommodation for them to live away from home or for daily transport to school. Further consideration of this familiar situation is given in the first of the "Special Problems" (below, para. 3.21).

3.15 Schools or Areas Where Classes are Below the Acceptable Norm: Here, pupil/teacher ratios will be low and per student costs high. This may occur in areas where there are too many schools competing for available pupils or, conversely, where there are too few pupils within the range for even one school, or where - for some social or economic reason - parents are reluctant to send their children to school.

i) In the first of these three possibilities, rationalization could consist of closing one of the competing schools that has a small enrollment but is situated very close to another school. However, there may be problems in this, for example, if they are single sex schools, would sending the girls to a boys' school be acceptable?; if there are religious schools, would sending adherents of one religious group to a school founded by another religious group be acceptable? Closing a school is always difficult, but rational school mapping programs must face this difficulty squarely.

ii) Where the threshold population is not reached within the range, enrollments may be raised either by extending the range norm, raising the target enrollment rate, or lowering the norms used to reach the threshold population. Extending the range norm may be acceptable in areas with low relief and few barriers to movement, such as unbridged rivers, but these possibilities are limited since the maximum acceptable range must be set at 5 km. In any case if the schools have low enrollments due to low walking distances, changing the planning norms will not immediately mean that children will be willing or able to walk further. In countries where enrollment ratios are generally low, additional enrollments may be taken into a school to raise enrollments within that particular school catchment area to above the regional target rate. Lowering the threshold norms will invoke the possibilities of biennial intakes, multi-grade teaching or nuclear school networks (see below, para. 3.23).

iii) Lack of demand may be due to a relative antipathy towards schooling. The assumption that mere provision of a school even in areas with sufficient people will ensure its full use is invalid for some areas. SLP must be aware of difficulties in this respect and the mapping exercise will identify areas where these occur. Efforts may then be made to encourage higher rates of school attendance, by lowering or abolishing school fees, or providing a midday meal or whatever (see also para. 2.39).

3.16 Schools or Areas Where Classes are Above the Acceptable Norm: Here pupil/teacher ratios are higher than would be considered pedagogically acceptable. The problem clearly is a shortage in provision. Is the area in question one in which population densities are sufficiently high to allow double-streaming at some or all schools, i.e. doubling the teaching space? If so, can the capacities of existing schools be expanded (i.e. are their sites large enough for new buildings?). If not, it may be necessary to build new schools in areas between the over-full schools, or to have double-shifting, i.e. separate morning and afternoon sessions, in the existing buildings. In general, given the relationship between distance walked to school and retention in school, it would be more acceptable to have a larger number of smaller schools and a smaller range than fewer, large double-stream or double-shift schools. However, there may be significant cost advantages in having double-stream schools (e.g. the need for only one headmaster, and only one set of equipment) that will offset the spatial advantage of single-stream schools.

3.17 Qualitative Aspects: If there are marked differences in qualitative indices between one region and another, steps may be taken to redistribute resources. If, for example, a disproportionately large number of schools contain a large number of unqualified teachers, attempts can be made to encourage or send newly-qualified teachers into areas and schools, usually in the remotest areas, where they are most needed. This can be difficult, however, if these areas are least attractive to the teachers. In order to successfully achieve a redistribution it may be necessary to guarantee housing, land, or some financial incentives, or to require that a condition of promotion or salary increase is that teachers should have spent some specified time in these difficult areas, or that each year spent in such areas should count double for salary and promotion purposes.

3.18 There is a similar situation with the distribution of teaching materials in the schools. The provision of class books, teachers' guides, visual aids, etc., varies greatly from school to school, not necessarily as a result of deliberate misallocation of these inputs, but as a result of inadequate distribution procedures, notably a dependence on the "first come, first served" principle in a situation where the total supply is insufficient for equal distribution to all schools. This principle obviously favours the nearer and generally already better-off schools, which will also tend to have a high proportion of qualified teachers. Explicit concern for the poorer, more remote schools is required if they are to be provided with the additional resources they need.

Special Problems

3.19 Not all school mapping problems are similar, and at the local level there is a wide range of situations with which officials must be familiar. National norms can be established, but in most countries there is a variation in ecological, economic and social characteristics, and the application of the norms and the rationalization of the school map will have different emphases from one area to another. Many of the specific problems discussed in this section are related since they consider the relationship between the distribution and density of population and the type of educational provision most adequately suited to meet the needs of that population.

3.20 In Areas of Very Low Population Densities: Here, threshold populations will not be reached, even within the maximum acceptable range. How is education to be provided in such a situation? There are two types of solutions: nucleation of populations and lowering of the population threshold.

3.21 Nucleation of Populations: This may be achieved in one of two ways: either collecting sufficient pupils in one place for the attainment of a minimum acceptable school size, or bringing a dispersed rural population into larger settlements in a "villagization" program.

i) The most widely used nucleation measures specifically related to the education system are the provision of boarding facilities and/or provision of transport. The transport can be either buses or bicycles for individual pupils. With both forms of transport the daily range of a school is greatly extended. Both boarding and transport options are expensive and will greatly increase the capital and recurrent costs of education. They are much more widely used for secondary than for primary education, but even for secondary education the continuation of the boarding school tradition that has developed in some countries is being seriously questioned. As enrollment rates and population densities increase, normal day secondary schools become increasingly feasible. More familiar in wealthier couintries is the provision of daily transport, often through a legal obligation laid down as a central norm that all children whose homes are beyond a certain distance or journey time from school are provided with transport to take them to school. In many countries, however, not only are the funds to support such a measure not available, but the sheer difficulty of providing transport of any kind and maintaining the vehicles in rural areas without motorable tracks is a major obstacle. In such areas and even more generally, providing bicycles to individual students may be an effective (and cost effective) means to hasten the change from boarding schools to rural day secondary schools.

ii) Several countries have introduced "villagization" programs. These involve the concentration of the general population spontaneously or compulsorily into nucleated communities. One of the main purposes of doing so is to improve access to social provision in general: health facilities, clean water supply, etc., as well as schools. Wherever national policy is to promote villagization, educational planners should be closely involved in planning at an early stage to recommend either villages sufficiently large to allow a complete primary school to be built or the grouping of villages in close enough proximity to share a network of both incomplete and complete schools (para. 3.23). It would be optimistic, however, to claim that the Ministry of Education or the local education office could, independently, influence the settlement pattern to any significant extent by providing or not providing schools in particular areas.

3.22 Lowering the Population Threshold: It is unacceptable to deny education to children living in sparsely populated areas simply because the national threshold conditions cannot be met. If enrollment rates in such areas are not to fall seriously behind the national levels, access to schools must be extended by lowering the threshold levels determined by the national norms. This implies a major deviation from what is probably the regular structure of the system as a whole, where the school is viewed as having one class and one teacher for each grade. Instead a more flexible system is envisaged in which both size of school and the type of teaching can vary.

3.23 There are three methods of overcoming the difficulty:

(i) It may be accepted that the period of compulsory schooling in such areas is shorter than the national norm. It is more likely that a threshold level for a four-grade school rather than the national six-grade can be reached given the common practice, more prevalent in backward areas, of delaying the entry in grade 1 given to provide an access ladder for some of the grade four graduates chosen by merit to attend grades five and six in a nuclear or central school. Boarding or transport facilities may have to be provided for them although children at that age may also be expected to walk or cycle greater distances than those in the lowest grades. It must be recognized, however, that in any nuclear system of this type distance from the pupil's home to the central school will be a factor affecting progression from the feeder school. Care should also be taken to ensure that this "nuclear" school network solution does not decrease, but instead increases parity between urban and rural areas in enrollment progression in the higher grades.

(ii) Biennial intakes may be introduced. In this case there is still provision for all for the complete primary course, but entry into grade one occurs every second year instead of every year. In a six-year primary school system, only three classes and three teachers are needed, and the threshold population is half the national norm. The acceptability of converting to a biennial intake may depend on a vigorous campaign by local officials to persuade parents of the advantages of the system.

(iii) Multi-grade teaching may be introduced. This involves a potentially far-reaching and flexible possibility for reform and one which is common in some, but not enough, countries given its advantages. This envisages that in any one classroom, children of different ages and grades will be taught by the same teacher. The exact form of the multi-grading will vary with circumstances. In its most moderate application there may be multi-grading only in one classroom, say, combining students of two adjacent grades. But in the least densely populated areas, a one-teacher school will have all children in all grades in the same classroom. Such a system creates a new teaching environment and may benefit from the use of student "monitors" to assist the teacher with the younger children. There is, in fact, evidence to suggest that multi-grade teaching can be academically more efficient than single-grade teaching, but there need to be specific training courses for teachers who will be involved.

3.24 Biennial intakes is probably the most generally applicable of the three methods. A feeder/central system requires considerable administrative control, and distance will normally remain a problem. The success of multi-grading will depend largely on the quality and dedication of teachers who can be attracted to remote areas, and experience here in the majority of the borrowing countries is not encouraging. Biennial intakes require no adjustment on the part of the teachers in the classroom.

3.25 In Areas of Very High Rural Population Densities. At the other extreme of the range of population densities are those areas where the threshold for a two or even three-stream school may be reached, given the national norms for range and enrollment rates. Local planners will then need to consider whether to have large schools and maintain the normal large range or have more but smaller schools with a reduction in the range. As a rule, at the primary level preference would be given to adopting a shorter range criterion, and vice versa at the secondary level. However, the choice should depend on local walking conditions and whether enrollment rates are to be raised rapidly, in which case intensification of the use of existing facilities through double-shifting could be a solution to achieve rapid results without much capital investment. The amounts of equipment, the degree of specialization of staff, and the intensity of use factors for special equipment, staff, and space affect the economies of scale of the individual school, and may dictate choice of alternatives. Properly implemented, double sessions should not double the teacher's workload without an increase in rewards; nor should it significantly reduce the pupils' daily hours of instruction. With these provisos double sessions should not reduce learning efficiency.

3.26 In Areas with Nucleated Settlements: It was assumed in discussion of the two previous special cases that the rural population was fairly evenly distributed throughout the area concerned, though at very different overall densities. In many areas, however, the settlement pattern is characterized by nucleated villages rather than dispersed settlements, though overall population densities may be either high or low. As many as 95% of the population in any area may live in one or a few villages whose populations may be as low as 100 or as high as 5,000, and these villages may be over 5 km. from their nearest neighbors. Provision of schools would logically be on a one-per-village basis. Some villages will have a population below the threshold norm; others will have a population above it, but provision will need to be such that the enrollment to be expected is catered for. This will require institutional flexibility of the kind discussed above, so that not all schools will be a standard size. In small villages there may be a need for multi-grading, in large villages there may be some need for double-streaming. The exact form of the flexibility will depend largely on the size of the settlement, and may be permitted to vary from one region to another.

3.27 Urban Areas. Urban areas are the extreme case of a nucleated settlement where perhaps 100,000 children of school age live within the range of a school. The problems and practice of school location planning are, therefore, rather different for urban areas. The differences arise principally because range, as a maximum walking distance, is less important for practical planning. The central issue is not to identify the lowest threshold, but to identify the school size beyond which financial, education and administrative economies of scale decline. The most common symptoms of malfunction is extreme over-enrollment in schools with limited student space allotments and a school management which is poorly equipped to deal with a large scale operation.

3.28 Maximum size of school will be the number of student spaces beyond which further expansion will be prohibited: optimum size of school is that number of spaces (less than the maximum) where school is deemed to operate at greatest efficiency, taking financial, administrative and educational aspects into account. Educational planners for urban areas must set these two levels, and the relationship between them: i.e. he conditions under which the maximum is preferable to the optimum (usually when current enrollment rates are low and when financial constraints most severe). The exact level will vary from country to country, and from one type of school to another, and will be based on existing knowledge of unit costs, educational attainment, etc. of urban schools. Primary schools, with less specialized equipment, facilities, and teachers, will have a lower optimum than secondary schools. It is common, however, to find that in those countries of the developing world where urban schools have expanded rapidly in recent years, present enrollments will have surpassed any rationally derived maximum figure.

At the present time, schools are of 10 streams per grade, including double triple-shifting (or even more), so that enrollments may be over 3,000 pupils, all of whom live within the range established as the national norm. Weak planning controls have enabled uncontrolled expansion relative to physical and especially organizational capacity.

3.29 In urban areas the pupil's social status will affect his/her access to schools in general or to a particular school much more than in rural areas where sheer distance is often the key. Catchment areas of schools in urban areas will usually be socially differentiated and overlapping to a considerable extent, unless specific measures have been taken to define them formally so that all children from any one "neighborhood" must go to the school in that area. The practice of having neighborhood catchment areas is highly desirable from a school location planning point of view, but its implementation is faced with several difficulties, the most important of which is the great range in quality of teachers and facilities between schools. These differences have arisen in urban centers often as a cumulative result of historical and social circumstances which have maintained certain schools primarily for elite, privileged sections of the population. Meanwhile, other schools have been seriously weakened by rapid expansion of enrollments without additional spaces and facilities. The latter also serve the rapidly expanding urban poor who may lack an ability to ensure that an equitable share of inputs reach their neighborhood schools. The first priority of urban school mapping must therefore be qualitative rather than quantitative, i.e., to reduce or even eliminate variations in facilities and teacher qualifications between schools. The schools can later move spontaneously towards neighborhood catchments.

3.30 Older urban areas and especially capital cities normally have the highest enrollment rates in countries where there is no universal education. Apparently high enrollment rates may be inflated by high rates of student migration into towns, or just by the poor quality of data on the age group population. The population of urban areas is unusually mobile, especially in the teenage age range. At a national level, policy may be to restrict or prevent the allocation of resources to urban areas in favor of rural areas. This can certainly be justified on the grounds of equity, but it ignores the serious problem of the low levels of provision for the urban poor. Social and economic contrasts are most marked within urban areas, and relatively high overall levels of provision may be more a reflection of only the high average socio-economic status of the urban population. The mean will obscure the fact that the urban poor may have less opportunity to attend school than most children in rural areas. The urban school system must, therefore, ensure that access is extended to all social and economic groups.

3.31 This can be done in one or two ways:

(i) By building schools in or near sections of cities where the poor live. Although catchment areas of existing schools may not be clearly identifiable, the allocation of land for schools in site and service or squatter upgrading schemes ensure that a high proportion of children in the school will be associated with the scheme. The school can become a focus of the new community, to be used for adult education as well as formal schooling;

(ii) By improving the schools' data collection procedures. Data on the distribution of age groups and of social and income groups in the urban area are difficult to collect, so that it may be impossible to identify whether or not access to schools is sufficiently broadly based. Data on the home location and personal circumstances of pupils in the schools could be collected, and used to identify for each school and for the city as a whole the extent of social differentiation in initial access and in subsequent progress within the schools. The problems of high dropout and repeater rates in urban schools are probably related to poverty, and measures to prevent dropouts (such as waiving of fees, granting of financial incentives) may considerably reduce the problem.

3.32 It is clear that SLP in urban areas should have a strong qualitative bias, to improve social access within the existing system and to reduce inter-school qualitative disparities rather than through expansion of schools. However, expansion of the capacity of the system can also be as important. Given the tendency to oversized schools, rational expansion requires more rather than larger schools. Large schools have certainly assured, with double-shifting, a more intensive usage of existing facilities. However, consideration also needs to be given to the building of additional schools, especially in areas near the periphery where the town is expanding.

3.33 The largest single difficulty in providing new schools is the acquisition of suitable sites. Land in urban areas is expensive, and can account for a high proportion of the total capital cost of a new school. However, in most cities the land use planning apparatus has been sufficiently developed to ensure that social amenities are provided as the city expands. It is essential that land is allocated in suitably large quantities to allow school building. School site requirements must be made known to the town planners, and estimates of any expansion needs of urban schools must involve the town planning authorities. The town planners will have access to the best estimates of aggregate population growth, of areas where population increase is most likely, or where population is stagnant or declining, and can therefore identify not only the aggregate demand for school places, but where in the city that demand will be strongest.

3.34 The following are basic minimum data requirements for drawing up and rationalizing the urban school map:

(A) Educational data -

Schools: Physical aspects, site, buildings, usage, capacity, teachers (number and qualifications).

Students: Enrollments in schools by grade. Individual data on age, sex, previous schools, home location, method of transport to school, time taken on home/school journey, parental background (occupational or educational).

(B) Urban area data -

A land use and administrative map on as large a scale as possible; planning reports; population census and survey data.

With these data education and urban planning officials can plan the provision of schools in the urban area using many of the techniques already discussed, while remaining aware of specific problems noted above.

Conclusion

3.35 The above sections take each of four special situations either high or low density with either a dispersed or nucleated pattern. They consider the particular difficulties implicit in those settlement patterns. Thus, though total numbers of people within the range is a measure of total potential demand, the way these people are distributed within the range, i.e. the settlement pattern, is an essential variable in planning the pattern of educational provision. Local officials must deal with these features of population distribution if school mapping at the local level is to be successful. They must have a good knowledge of their area, strengthened by regular field visits and fairly long periods in one post.

3.36 In this, as in other respects, it is evident from the presentation in this section of these guidelines that the responsibilities of the local education office must include not only administrative work and "crisis management", as is often the case in borrowing countries, but also a planning function, perhaps for the first time. This new responsibility will require that the staff of the local office needs to be strengthened, both in numbers and in skills. Local officials need to have some training in basic techniques of educational planning, to which training specific to school location planning will be added.

SECTION D - THE IMPLEMENTATION OF A SCHOOL LOCATION PLANNING PROGRAM

4.01 Rational school location planning will ensure that the implementation of any broader plans for educational development is done to maximum benefit of the community. A set of procedures to be followed when a school location program is being introduced have been suggested, and in this concluding section of the guidelines specific attention is given to the administrative structure through which these procedures may be implemented.

4.02 The structure and functions that are suggested, assume a two-tier hierarchy, with responsibilities split between central and local officials, though this may vary according to the administrative structure of each country. These differences exist, but it is important to emphasize the links and flows between the tiers of the hierarchy, for school mapping requires a direct and constant dialogue between all levels. In many other aspects of educational planning such links are weak or non-existent, but in SLP important decisions are made both centrally and locally and each must know what the other is doing and how it is doing it. The emphasis in school location planning is biased toward the importance of local decision-making under the overall supervision of the central planners.

A Central School Location Planning Unit

4.03 Overall responsibility for the implementation of SLP should rest within the Central Planning Department of the Ministry of Education. A capability in SLP should be established within this Department, and where the Planning Department is sufficiently large, this would have the status of a Unit or Section. Its principal function will be to act as a direct link between the Planning Department and the local Education Offices, to ensure the cooperation between central and local officials.

4.04 Within the school location unit there must be at least one educational planner with knowledge of SLP, either from direct experience in other countries or from training programs where school location planning has been a major element. Such a person would have, if possible, a background in planning, geography or demography. Such a background would be very useful for a thorough appreciation of the problems of relating the distribution of schools and of population that is at the heart of school mapping. He or she would, however, be part of the main educational planning team and conversant with other aspects of educational planning (Appendix IV).

4.05 The unit responsible for school location planning has two principal functions:

(i) to ensure that the norms of the school system enumerated in Section B above are established and that the data collection system is adequate for school mapping;

(ii) to ensure that the full potential of school mapping is realized at the local level.

4.06 The first of these involves the work of the SLP unit within the Central Planning Department. Decisions will be reached regarding the norms to be established (if this has not already been done) and used in the schools. The team itself should be directly responsible for advising on features specific to SLP, particularly range and threshold. It may wish to conduct its own enquiries, or to commission them through local universities and social research organizations. It will be responsible for assembling age-group population data for census officials and projecting these forward for each region. It will also liaise with planning officials of other ministries to ascertain what regional developments are proposed with implications for population changes and new school services. The unit will also suggest additions to the established data collection systems. This will normally involve the addition of specific geographical questions on the location of each school, its student space capacity, its catchment area, etc. (para. 2.21). In this, the senior officer should be supported by clerical/statistical assistants and a draftsman/cartographer. The latter may be on loan from the Mapping Service or other Government agency when the need arises. However, if local school maps are being compiled for the first time, there may be considerable demand for cartographic services. It will be the responsibility of the unit to provide appropriate base maps to the local offices.

4.07 The liaison function with local officers will involve three main components:

(i) The senior officer will act as a channel for distributing the centrally available data mentioned above;

(ii) He must be expected to tour the country, visiting local offices to make initial contact with the local officials, to describe and explain the overall strategy of SLP, and to familiarize himself with the problems of each particular region;

(iii) He will be responsible for holding a workshop or workshops for local officials for perhaps one week each to give these officials a basic training in the school location techniques they would need in order to compile and use a school map for their district. A possible outline program for such a workshop is given in Table 4.

Table 4: SLP Workshop: Proposed Program

Day	Purpose	Methodology
1	Aims and concepts of school mapping	Discussion, with examples, of what school mapping entails, and some of the concepts (e.g. catchment areas, population thresholds) it uses, all in the context of educational policies of the country.
2	Examination of the data base (a) Population data (b) Maps (c) Education data	(i) Detailed discussion of these, with contributions from Census Office, Survey Dept. etc. (ii) Desk exercise based on the analysis of the three sets of data to identify patterns of provision.
3	Analysis and critique of previous experience in school mapping	Discussion, with field visit if possible, of previous experience of mapping, and analysis of some of the data collected.
4	Conduct school mapping exercise in a previously unmapped area	Test possibilities and proposals for the general exercise in the field - involving all stages of the work - data collection, analysis, and preparation of plans.
5	Synthesis	Based on the experience of the previous four days, a final formation of detailed plans.

4.08 Once the initial effort in compiling a school map and applying it has been made, the input in manhours into SLP will be much less, but the maps and information system will be annually updated as part of normal statistical operations. The responsible officer will still be required to liaise with local officials as they adjust their school maps to meet changing circumstances, whether on evidence of population change or of declining or expanding enrollment rates, or as a result of changes in policy norms and standards.

4.09 Another function of the Central Unit must also be to establish regional capital and recurrent cost variations. The cost of school construction can vary from one region to another and will be generally higher in remote areas. Estimates of local cost variation may be provided by the Public Works Ministry or on the basis of previous experience of the Ministry of Education. There will also be considerable cost variation within each region, so that the mean regional figure must take account of the fact that it is likely that a high proportion of new school buildings will be in remote and therefore relatively high cost areas: this will require local sources of information.

4.10 A Local School Location Planning Committee: The local organization of the Ministry of Education can vary very considerably in size, according to the size of the area it serves and the degree of responsibility it has. It is assumed here that in each local office there is at least:

(i) a local Chief Education Officer who is in overall charge of the local education service and who reports directly to the central Ministry;

(ii) a local Schools Inspector whose primary duty is to ensure adequate qualitative performance in the schools;

(iii) an assistant whose primary function is to collect statistical returns from each school and to compile them into regional summaries.

Where school districts are small and the administrative system is relatively unsophisticated these three distinct functions may be performed by the same person.

4.11 Responsibility for the compilation of the existing school map will rest with those officials. At least one person from the local office but preferably all three of the above will have attended an introductory course on the aims and methods of school mapping organized by the Central Planning Unit. He should be thoroughly knowledgeable on local affairs and should know each school in his district. He will be able to coordinate the norms set and the population and other data provided by the Ministry, so that an accurate map can be made, and supported by relevant data on location, enrollment, etc.

4.12 The map will then be analyzed and its deficiencies identified by a team comprising those senior local education officials (or official) responsible for the compilation of the map, another person with detailed local knowledge of regional development activities and population (perhaps a general administrative official) and a representative of the Central Planning Unit, who will offer technical expertise as well as ensuring that the national norms are being satisfied. The team may be enlarged as circumstances permit to include other local officials or representatives of other interested parties, such as teachers' or parents' organizations. This team will have the authority to recommend or decide on how to restructure educational provision where necessary: on the location of new schools, on amalgamations, allocations of teachers, etc. Considerable rationalization will be likely in the earliest phases of school location planning after the initial map has been made, but in each subsequent year the team should consider small improvements to the school map in the light of circumstances prevailing at the time.

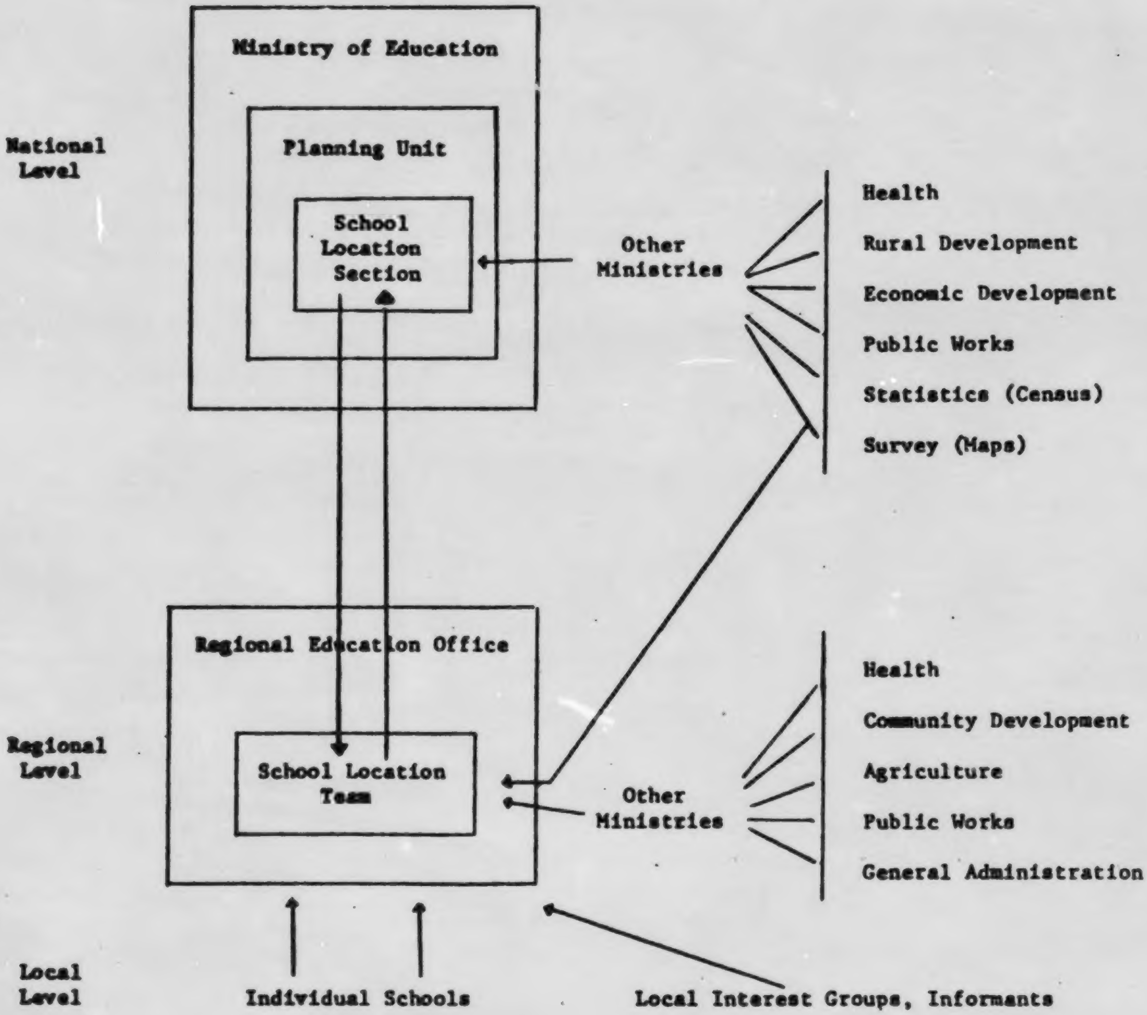
4.13 The essence of this effort is local involvement, with technically proficient local officials aware of the requirements of the area and responsive to the wishes of the local community. Decision-making is not dominated by outside "experts", from central Government or elsewhere, since the role of the central authorities, who must always be a tiny minority in the local team, is limited to offering technical advice and setting the parameters within which the local decision-making can operate.

4.14 Table 5 is a summary table of the responsibilities and steps outlined above. While the central unit plays a greater role in the earlier phases, the local units are preeminent in the implementation stage. Table 6 identifies the nature of continuous dialogue that must exist between the central and local authorities. The inclusion of an official of the central ministry on each local school map committee ensures a continuous evaluation by the centre built into the system. Local committees will not only conform to the national norms in general, but can deviate from them in the peculiar circumstances of their region, e.g. where there are very low population densities. This deviation will be sanctioned by the central representative on the local committee, but at the same time standardization will be assured for normal circumstances. The combination of technical advice and local knowledge will produce a rational school map that can be continuously refined.

TABLE 5: CRITICAL PATH TOWARDS IMPLEMENTATION OF A PROGRAM IN SCHOOL LOCATION PLANNING

STAGE	CENTRAL AUTHORITIES	REGIONAL AUTHORITIES
DEFINING OBJECTIVES	Identify problem (e.g. regional inequalities)	Identify problem: e.g. low pupil/teacher ratios; uneven distribution of access
	Formulate policy objectives to be solved (e.g. reduce regional inequalities)	
METHODOLOGY	Formulate general strategy to achieve objectives	
	Conduct training courses/ workshops to develop strategy in detail	Attend workshops; assist in formulation of national strategy
DATA COLLECTION	Collect secondary data sources (census data, maps, regional planning policies, etc.)	Conduct inventory of school facilities
		Gather secondary sources
ANALYSIS	Provide technical assistance	Analyze inventory data, including drawing of school maps and relating data to population and other data
PLAN FORMULATION	Establish norms	Apply norms to prepare a new expanded or rationalized distribution of schools or other inputs
	Assess regional plans individually and as a whole	
IMPLEMENTATION	Provide financial and other support	Implement building program envisaged in Plan

TABLE 6 ADMINISTRATIVE RELATIONS FOR SCHOOL LOCATION PROGRAM



Manpower Requirements

4.15 The work involved in SLP will impose some additional manpower requirements on the Ministry of Education, and particularly while a school map program is being established for the first time. The extra manpower burden will fall principally at the centre, for although the role of local officials is a major element in the work, that work can be done in most cases by existing establishment since it develops out of and indeed only serves to formalize some of their existing duties. With the recommended support from the central planning unit the additional burden will not be very great where the basic administrative framework is already established. Where that local framework is not established, additional and permanent posting of local education officials is a necessary condition for successful implementation.

4.16 In the Ministry of Education the program will be the responsibility of one planner and his assistants in the period when it is first being developed. The responsible officer should have experience in this area, and should be either:

(i) a local official who has undergone training in SLP, or

(ii) an expert who should be hired for a specified period (probably 18 to 24 months) and to whom is allocated an alternate who would be trained to assume overall responsibility at the end of that period.

The first of these is the preferred alternative, and fellowships ought to be provided in advance of formulation and implementation.

4.17 Roughly an 18-month period would be necessary for a trained person to develop and administer a complete school map program in any country, but the length of time will be affected by the size of the country, the existing data base, current technical capabilities of local officials and the degree of sophistication required. A general outline of his work program would be:

(i) Months 1-3: establish the potential role for the school map; identify the kind of data that are required; become familiar with the problems of educational provision at the local level.

(ii) Months 4-6: develop a program for implementation; identify norms; conduct a course (or courses) for local officials to introduce to them the principles and methodolgy. This course should be at least one week in duration, and consist of discussion of demographic, geographical and educational aspects of the program with practical exercises (Table 4). In order to derive full benefits from such a course, each local official should prepare in advance a preliminary identification of the issues that will be faced in school location planning in his region.

(iii) Months 7-12: data collection and analysis, with regional tours to assist in compilation of local school maps and data collection.

(iv) Months 13-18: diagnosis of national patterns of school provision; diagnosis of regional patterns of school provision; assisting the school map program at the local level through the local committees.

By the end of this 18-month period the framework will have been established, the maps drawn up and recommendations for rationalization made, perhaps in the light of some expansion or reform. The volume of work required will decline subsequently and the official responsible, will probably need to spend no more than half his time on school location matters directly.

Costs

4.18 The manpower addition is the principal direct cost of a school location program. The exact cost will depend on the size of the unit established in the Central Ministry. In large countries with a three-tier administrative structure it may be necessary to have officials with expertise not only in the Federal Ministry but in Provincial or State Ministries. The provincial officials can be introduced to SLP in specially arranged courses of two or three months, organized by one of the international agencies involved in educational planning or by the central official already trained.

4.19 In countries where existing data collection procedures are weak, a further major element in the cost of the proposed program may be the collection of the data specific to SLP. This will involve time-consuming data collection exercises in the field with visits to each school. This may need to be done by field assistants especially hired and trained for the purpose, with the costs of their training and subsistence allowances in the field adding to the total cost. There is a similar cost escalation where a large number of personnel from the centre become involved in the exercises at the local level, for their travel and subsistence expenses need to be met. These personnel will be middle grade local people, often university students or student teachers hired during their vacations for a schools' facilities inventory. The use of such people and their learning "on-the-job" can in itself have a considerable institution-building effect within the education sector. Where data collection systems are already adequate, however, the additional costs of data collection for a school mapping program are small.

4.20 Costs of materials are also likely to be minimal. Official maps are usually extremely cheap. For a country as large as Pakistan, for example, there is almost complete coverage of the country at 1:50,000 (1,400 sheets of which 1,100 are available) and at 1:250,000 (107 sheets) the total cost of purchasing two copies of each set of maps is only $2,000. Census reports, similarly, are essential materials, and are normally very cheap, if not free to Government Departments.

Benefits of Implementing a School Mapping Program

4.21 The principal beneficiaries of the introduction of SLP will be the pupils in the classrooms and pupils who previously were denied access to school or equal opportunity to progress to higher levels once they were in school. Rationalization of the school map will allow more children to be more accessible to schools and can also contribute to a reduction in per student costs. With a more direct link between the schools and the community, education will be increasingly seen as a community activity, and will therefore be more likely to act as a stimulus to development.

4.22 The administration of education will also be considerably strengthened by the delegation of greater responsibility to local officials. They will become, perhaps for the first time, decision-makers as well as administrators in a new strengthened position in the local area. Decentralized control will certainly stimulate local interest in the local schools, an interest which can be channelled to further developments such as community action or self-help to build new schools. By formalizing what is often an existing but much looser, ad hoc, procedure, local control of the distribution of schools and other inputs into education can bring more people into the system and promote wider aims of equality of opportunity. In taking planning to the local level greater success in implementing national plans is guaranteed.

4.23 From the point of view of the Ministry of Education, rationalization of the pattern of school provision will bring a reduction in unit costs, and this certainly can be considerable. It will be achieved in primary education by ensuring more acceptable pupil/teacher ratios such that more children can be in school without any additions to the teachers' salaries; and in secondary schools by ensuring more intensive use of specialist facilities and a reduction of boarding costs. The costs incurred in developing SLP will be far outweighed by these savings.

FOOTNOTES

1/ Most of the literature that is available on school location planning has been produced as part of a large project of the International Institute for Educational Planning (IIEP), 7/9 Rue Eugene Delacroix, Paris 16^{e}, France. This literature comes under three broad headings:

(a) A general synthesis by the Project Director, Jacques Hallak "Planning the Location of Schools. An instrument of educational policy" (1977, UNESCO: IIEP). This sets out in greater detail than these guidelines a comprehensive synthesis of school location planning, how it has been used and how it may be applied. This volume is a useful technical document for any country seeking to establish a school location program. However, it advocates a more centralized and bureaucratic strategy than is presented in these Guidelines, and emphasizes the benefits in cost saving of SLP where there is already universal enrollment.

(b) Case studies: a series of 12 studies for Ireland, West Germany, Uganda, Nepal, Lebanon, Iran, Morocco, Costa Rica, Ivory Coast, Sri Lanka, Algeria, USSR.

(c) Papers from intensive training courses given by IIEP. These deal in detail with specific aspects, e.g. the relationship between population data and school planning; the urban school location problem. These may be available directly from IIEP.

2/ Space Productivity Rate =

$$\text{Space Productivity Rate} = \frac{\text{Completers of a cycle}}{\text{spaces available} \times \text{length of cycle (years)}}$$

3/ Boarding secondary schools have been important in Africa in providing access beyond primary school to pupils from all parts of the country. When there were few secondary schools the boarding school was an effective instrument for spreading opportunity. However, typical costs per pupil are double those of costs in day schools, so that there is considerable pressure to reduce the importance of boarding by either converting some of the boarding facilities into classrooms, or at least ensuring that all new capacity is in day places.

4/ The whole area of education for the urban poor is assessed in H.M. Phillips (1978) *Education and training programs and projects for the urban poor*, Document of The Education Department of The World Bank.

Appendix I

SCHOOL LOCATION PLANNING IN WORLD BANK PROJECTS

There is some recognition of the geographical distribution of project components in the preparation, appraisal and supervision of all education projects. However, the criteria according to which a specific location is chosen or to which a general distribution is made have generally remained implicit in the project reports, or else have warranted slight attention in comparison with the wider educational and economic issues raised by the project. This was to be expected in earlier projects, where there were usually a small number of individual facilities in any one project (e.g. a university or a few technical institutes), or where the country in question had few schools and sought additions based on a general spreading of the distribution, such that exactly where these additions should be made was not perceived as a problem in the short-run, since they would be used to capacity wherever they were. Up to about 1974, therefore, projects did not normally approach school location planning in a systematic fashion.

At about that time circumstances changed in four particular respects -

(a) The World Bank as a whole, through its new emphasis on equity strategies, began to be concerned with distributional issues directly, including the distribution of educational opportunity:

> "Equalizing access is, of course, the first step. The appropriate location of educational facilities is a simple but effective instrument, particularly for lower levels of education where physical proximity is a major factor for determining enrollments." (Education Sector Policy Paper, 1974, p. 34).

(b) As implied in the above quotation the Bank had begun from 1970 to be involved in primary education, so that projects began to deal with a large number of small facilities (at the extreme with 850 rural primary schools in Malaysia IV). How were these to be distributed?

(c) Even in those countries and at those levels of education where in earlier projects the location of the schools did not seem to matter greatly, as the systems expanded additions needed to be increasingly carefully located to avoid increasing regional inequalities.

(d) The IIEP Research Project "Planning the Location of Schools", directed by Jacques Hallak and supported in part by the Bank, had begun in 1971 and by 1973 case studies had begun to appear and a methodology was beginning to emerge.

These factors are reflected in the increasing numbers of projects that have specifically considered criteria for the location and distribution of schools. Table I(1) summarizes those projects by Region.

EXAMPLES

These projects may be placed in one of two categories:

-- those having a general SLP program as a component of the project as a whole; or

-- those involving the location of project facilities, either individually or as a group.

The following are detailed, technical discussions of the SLP component in four recent projects, with two in each of the general and specific categories and from projects in low and middle income countries.

	General Component	Project-Specific Component
Middle Income	Thailand V	Malaysia V
Low Income	Honduras II	Burundi I

Each example identifies the objectives, methodology and problems of the SLP component, and the variation that is evident exemplifies the need for great flexibility in approaches to SLP, for each of the four projects has different objectives, develops a different methodology and makes its own distinctive contribution to educational development in the country.

SCHOOOL LOCATION PLANNING IN WORLD BANK APPRAISAL REPORTS

Country	Date of Effectiveness	SLP Component
Ethiopia IV	1975	All components: annex setting out criteria for locating facilities in the various cycles.
Burundi I	1977	Allocation of 100 Centres de Formation Polyvalente.
Sierra Leone II	1977	Support for a study of "Access to education", including diagnosis of locational issues.
Liberia III	1977	a) Provision of 12 man-months technical assistance in school mapping; b) Provision of buses in two secondary schools as an experiment to ascertain the feasibility of providing science courses for rural children one day per week.
Thailand IV	1977	Location of 50 diversified secondary schools; criteria in Educational Working Papers
Malaysia IV	1977	Construction/reconstruction of c.850 rural primary schools, analysis in Chapter III, and in Appendix 4 "Educational Planning and School Mapping".
Malaysia V	1978	Location of c.70 lower secondary schools.
Dominican Republic II	1975	Construction of over 200 schools in 15 newly established nuclei in the poorest parts of the country.
Nicaragua II	1976	Establishment of 18 rural nuclei, and appropriate reorganization and reconstruction in each.
Paraguay III	1977	a) Identification and construction of 83 learning centres within a nuclearization program; b) Financial and manpower support for facilities inventory and mapping.
Bolivia I	1977	Establishment of 91 nuclei in the Altiplano area and identification and implementation of construction needs in each.
Honduras II	1978	a) General school mapping exercise; b) Identification of 588 schools in 40 nuclei for project focus.
Haiti II	1978	Mapping exercise to identify locations of 31 project school in three regions.
Tunisia III	1976	Provision of 5th and 6th grade workshops in 156 existing schools and building 55 new primary schools in areas of in-migration and high population growth.
Egypt I	1978	Support for National School Mapping Study including 12 man-months of technical assistance (Annex 18)

Appendix I

A. THAILAND: DEVELOPING LOCAL PLANNING CAPABILITY

The Fifth World Bank Loan for Education in Thailand is expected to become effective in early 1979 after its appraisal in June/July 1978. There are several distinct components in this project, the smallest of which in terms of financial requirements is a national program of school mapping, jointly sponsored by the Ministry of Education (MOE), the Ministry of the Interior (MOI) and the National Education Commission (NEC).

The formal educational system of Thailand is relatively well-developed, with high rates of enrollment in primary school and a target of u.p.e. by 1981, and current efforts (assisted by a previous World Bank loan) are also aimed at expanding lower secondary enrollments through major expansions of secondary schools away from the larger towns. Education is managed through different agencies, with the administration of primary education the responsibility of MOI, through its Department of Local Administration, Division of Rural Elementary Education. MOE has responsibility for curriculum development and other qualitative aspects of primary education and for secondary education, principally through its Department of General Education, but the Departments of Vocational Education and Private Education are also important influences on the shape and size of the secondary system. The Province is the unit of control for the primary system through the Provincial Governor, an appointee of the Minister of the Interior, but the administration of the Ministry of Education is through twelve Educational Regions, each comprising several provinces. However, both the Ministry of the Interior and the Ministry of Education have strongly centralized decision-making structures.

The National Education Commission is a unit within the Office of the Prime Minister, and seeks through research to act as a stimulus to the improvement of education in both MOI and MOE. The proposal for school location planning is consistent with this role, for the project component is proposed as a research project in the first instance, but with obvious implications for subsequent incorporation into the regular planning operations of both Ministries. The need for SLP arose at the time it did for two particular reasons:

(a) Equality of opportunity. This project is a logical sequel to a previous project in NEC, "The equality of opportunity", which in 1974 identified a high level of disparities in initial access to and retention and achievement within the primary schools, and further analysis of indicators in 1977 confirmed that most of these disparities remained. Schools in central Thailand are much better equipped with material and financial resources than schools in the rest of the country, with the North-East as the worst off. The National Plan calls for a reduction in socio-economic disparities, and planning in education therefore needs to be aware of and reoriented towards dealing with the observed inequalities. The SLP project was designed to consider what appropriate planning measures might be.

(b) Educational reform. Beginning successively from 1978 a 4-3-3-2 structure is being replaced by a 6-3-3 structure. The immediate consequences for SLP are considerable for there is a need to adapt the existing network of lower and upper primary schools to an integrated six-year primary school. How many primary schools have to be expanded, and where are they located? How can universalization of primary education be achieved by 1981? How much and where is it possible to integrate lower and upper primary schools? The project will develop a methodology to approach such issues.

While these were the immediate reasons for the proposal coming forward when it did, there is in the project an implicit but in the long term more fundamental objective of encouraging local decision-making in the field of educational planning. The development of a capability in SLP is an appropriate but not in itself sufficient strategy towards achieving this objective.

The project was elaborated and tested during 1977/78 and the proposal forwarded through the Ministry of Education for Bank support. In some respects the proposal came several years too late, for it ought to have preceded the structural reform so that proposals based on the results of the research were available to be implemented in 1978 when the reform began and not several years after. In practice decisions about the rationalization of the primary school system were being made in 1978, before the main phase of the project had begun. NEC is certainly aware of this problem, but has found that a longer term, less direct approach has been necessary to permit its being sanctioned by both MOE and MOI. However, by the time the project is completed in 1981, the Fifth Education Plan will be in its final stages of formulation, and it is hoped that results of the research can be incorporated into that Plan.

The research project has three basic stages.

1. Preliminary preparation (i.e., by NEC staff and from Thai Government resources, pending external support for the bulk of the work, in stage 3). This has lasted approximately one year, and consisted of:

   (a) developing an overall research strategy, which was done with the assistance of and ultimate sanction of a Policy Committee of senior officials of MOE, MOI, NEC and outside experts. Particularly important in this last group for the development of mapping and population data requirements was a local expert, a faculty member in the Geography Department of a local university, a specialist in rural planning problems.

(b) selecting three pilot regions - the selections were based on several criteria, including the need to have a good geographical spread in different economic zones of the country, a known local expertise, whether in a local university or teacher training institution, and local education officials who were willing to cooperate with the NEC team.

(c) establishment of a Technical Committee for each pilot region, and their coming together in a three-day workshop to discuss the project and the inputs that are required from the local personnel. Each Technical Committee comprises a majority of local representatives of all agencies concerned, and is chaired by the Provincial Governor. The secretary of each Committee will be a senior official of NEC directly involved in the project, so that in practice many of the initiatives in the pilot studies will emenate from NEC. An Operation Committee composed of local officials who will be responsible for the data collection and plan implementation is to be formed. They are members of the Technical Committee and are responsible to it (Table A1).

2. Pilot studies

(a) Data collection is the most time consuming and most expensive part of the operation. This will be done with the aid of research assistants who will be local students, preferably in TTIs, for whom the work of data collection can be seen as an integral part of their studies in education. They would be given training for this, and each team would be supervised by a member of the local Operation Committee. The data will be mostly collected specifically for the project. They fall into four categories:

(i) Educational data: these will be collected through inventories in each school, and will involve physical aspects (number, size and condition of the buildings), school equipment and past achievement, teachers and their qualifications, and basic data on the students, including their journey to school (time and distance). Some of these data may be already available in the offices of District Education officials.

(ii) Socio-economic data: these will involve the collection of a small amount of data through questionnaires on relevant aspects of the community life in each district, including questions on parental attitudes to schools and schooling for their children.

(iii) Population data: a population registration system has been established in Thailand, with village headmen as the local registration officers for all births and deaths, but also for immigrants into an area. High levels of coverage are likely as the registration is linked to the issue of identity cards, which all adult Thais must carry for security purposes. There is therefore at the level of the village a reliable and continuously updated account of the school-age population. Unfortunately these data are only available in a raw form and field assistants will be trained to abstract the relevant data for each village from the local returns. While this is considerably more time-consuming than using available census sources, there is much greater accuracy, and the direct use of community data resources gives an additional relevance to the registration effort.

(iv) Maps: Thailand is well-served with topographical maps, but these maps do not show the administrative boundaries of the villages and sub-districts. Part of the effort in data collection must therefore be in the compiling of administrative maps.

Data collection in this project is more elaborate than is likely or necessary in most countries, for Thailand has set itself an ambitious target in the first instance that necessitates using data that are not currently available and need therefore to be collected specifically. For this reason, direct costs will be higher than in other programs. However, much of the data, once collected, will be of considerable general importance to the local administrations (e.g. the administrative maps) and to educational planning and research as a whole (e.g. parental attitudes, distribution of inputs).

(b) Data analysis will be done in two stages:

(i) basic analysis which will be done in the regions, primarily by the local education officials, but following guidelines set by the local Technical Committee;

(ii) supplementary analysis of more elaborate data that have been collected, particularly on the social and economic variables, using sophisticated statistical analysis available to the research staff of NEC. The results of these analyses will be discussed thoroughly with the local officials.

(c) Formulation of rationalization proposals, based on all the data and analyses, will be done principally by the local officials for it will be their responsibility to implement whatever proposals they make.

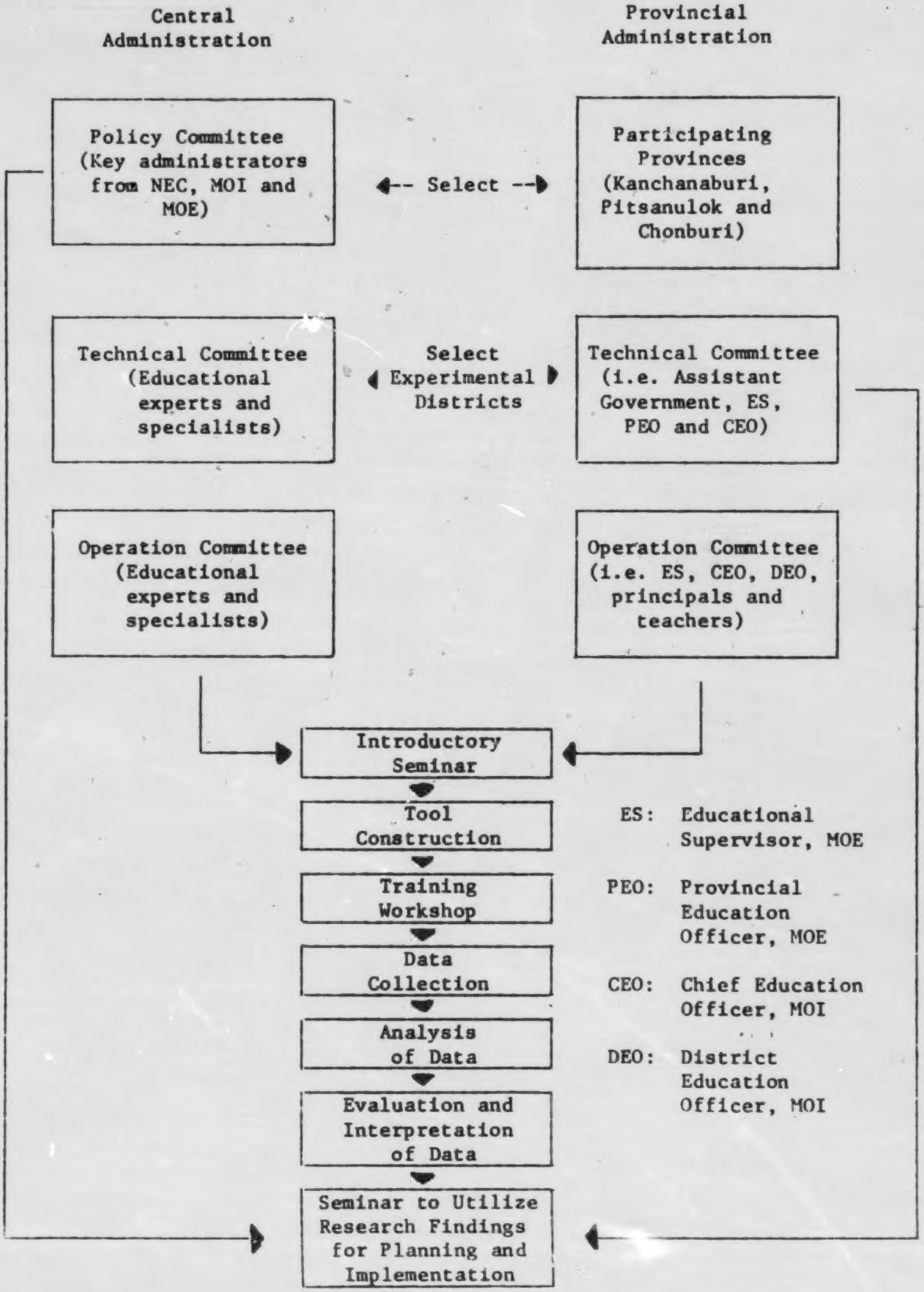
3. Studies in all other provinces. On the basis of the experience gained in the pilot studies, data collection and analysis will be done throughout the country as a basis for the formulation of province-specific rationalization plans (Table A2). The emphasis is placed on primary schools in the pilot studies, but will be extended to include an inventory of secondary schools, and hence the possibility of making proposals for the anticipated expansion of lower secondary education. A similar administrative and supervisory structure to that developed for the pilot studies is expected, but with rather less direct involvement of NEC staff, for not only will there be too much activity for there to be such close supervision and assistance, but also as more provincial staff of MOI and MOE gain knowledge and experience the need for NEC experts is lessened. All Operation Committee members will attend training workshops to be held for each group of provinces. They will then gather the required data using prepared forms such as a School Survey Form, a School Facilities Rating Sheet and Community Opinion Surveys, as well as the relevant population data from the local registration officer. Primary processing of the data will be done in each district by those who supervised the data collection, and initial findings and recommendations will be discussed by the Technical Committee for each district.

This will cover the whole of Thailand, except Bangkok, in a period of approximately two years. The need for SLP in the metropolitan region is evident, but the issues (e.g. the relationship between public and private schools; the role of school buses) are rather different from those in the rest of the country and finding solutions may require a different methodology. These will be tackled at a later date.

The costs of this program are mainly for salaries and allowances incurred in the training workshops, field data collection and analysis seminars. The only salaries to be financed wholly throughout the period are of NEC staff, and four local consultants on a part-time basis. There is no foreign technical assistance component. Operational costs necessary for

Table A1

OPERATIONAL CHART FOR PILOT STUDY


Central Administration
Provincial Administration
Policy Committee (Key administrators from NEC, MOI and MOE)
Select
Participating Provinces (Kanchanaburi, Pitsanulok and Chonburi)
Technical Committee (Educational experts and specialists)
Select Experimental Districts
Technical Committee (i.e. Assistant Government, ES, PEO and CEO)
Operation Committee (Educational experts and specialists)
Operation Committee (i.e. ES, CEO, DEO, principals and teachers)
Introductory Seminar
Tool Construction
Training Workshop
Data Collection
Analysis of Data
Evaluation and Interpretation of Data
Seminar to Utilize Research Findings for Planning and Implementation

ES: Educational Supervisor, MOE

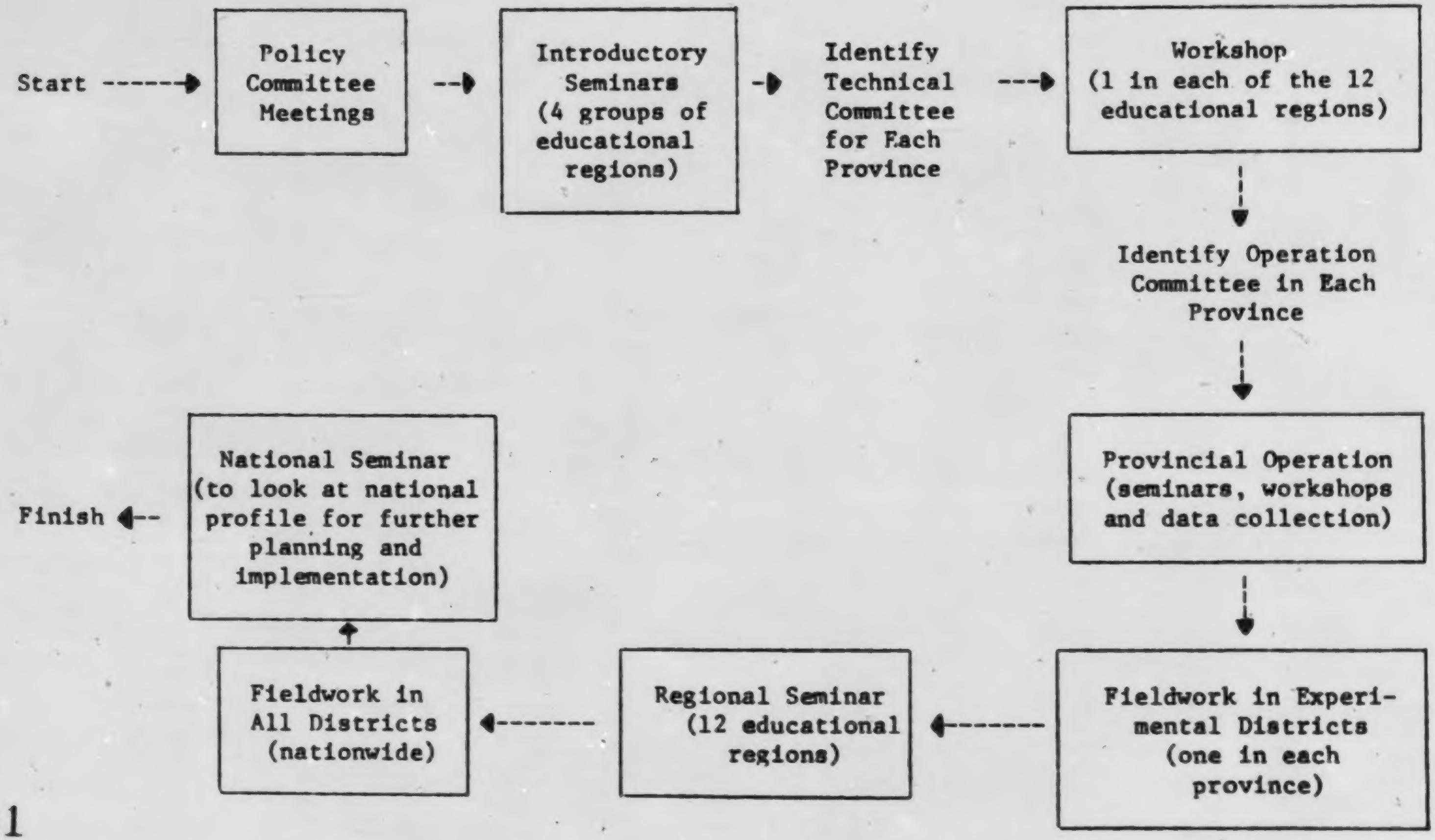
PEO: Provincial Education Officer, MOE

CEO: Chief Education Officer, MOI

DEO: District Education Officer, MOI

Table A2

WORK FLOW OF THE NATIONAL STUDY


Start
Policy Committee Meetings
Introductory Seminars (4 groups of educational regions)
Identify Technical Committee for Each Province
Workshop (1 in each of the 12 educational regions)
Identify Operation Committee in Each Province
Provincial Operation (seminars, workshops and data collection)
Fieldwork in Experimental Districts (one in each province)
Regional Seminar (12 educational regions)
Fieldwork in All Districts (nationwide)
National Seminar (to look at national profile for further planning and implementation)
Finish

field work (including purchase of two vehicles) are supported, as are the costs of required materials (purchase of a national coverage of maps, pocket calculators for members of Operation Committees to facilitate data analysis).

The project is less than ideal in some respects, especially as it is constrained by the particular organization of education in Thailand with its interministerial structure and strong tradition of centralized control. NEC will fulfill its function of encouraging innovation in education through this project, but it cannot directly make planning decisions on behalf of MOI or MOE. The proposals, however, are designed to encourage and support appropriate changes. The structure of the project emphasizes the linkages between the various agencies, and the linkages between the various levels of the decision-making hierarchy. Its greatest impact is likely to be at the local level in the fostering of cooperation between the field officials of different ministries and departments, for even where there is divergence at the Ministerial level, the cooperation between local officials in a program of SLP will mean a great deal for the rational delivery of schools. The work will also strengthen the vertical linkages within each agency in the dialogue pursued in the local committees, and local officials will enter more fully into educational planning as they begin to make and rationally justify decisions about the distribution of schools and other inputs such as teachers, learning materials, etc. The role of NEC as catalyst will decline as the project proceeds, for the expertise of the staff will become more generally available. The "research" components, of primary interest to NEC staff, will give way to the "applied" aspects as the initiative is taken up by officials of MOI and MOE.

B. MALAYSIA: FINDING THE APPROPRIATE SCALE

The principal goal of Malaysia V, which was appraised during November 1977 and April 1978 and is expected to be formally approved during the latter part of 1978, is to promote equality of opportunity at the lower secondary level. Over the last 20 years development strategies in Malaysia have sought to redress the social and economic inequalities inherited from the colonial period. More specifically, policies were formulated to allow the Malay majority to participate more fully in the economic life of the nation. Policies in education have been directed towards improving access by reducing the incidence of the greatest inequality of all - whether or not a child has a place in school. Developments have sought primarily to provide additional capacity, and this priority will remain until participation rates are higher than at present.

For the purposes of planning to reduce remaining inequities, therefore, quantitative indices of access must be used. The most widely used of these, the enrollment rate or participation rate, has been used in Malaysia in the past, but its current use is fraught with danger, due largely to the inadequacy of current population data. Crude enrollment rates for the primary school (enrollments in primary school as a proportion of the population in the relevant age group) would suggest that Sarawak, with a calculated rate of 95.3% has the highest proportion of its primary school-age children in school (Table B1), when it is evident that this cannot be the case. Indeed, it is likely that Sarawak has the lowest proportion in school.

In the absence of more reliable population data, the enrollment rate as traditionally defined for lower secondary grades was rejected in favor of an enrollment index (EI) that relates the enrollments in lower secondary school to the enrollments in the primary school. [1] This has the additional advantage of being more realistic where there is not universal primary enrollment. The size of the primary school cohort is a better reflection of the effective demand for lower secondary places in the near future than is any index based on the total primary school-age population, some of whom may never go to school. The rankings of lower secondary enrollment rates and enrollment indices are similar (Table B1).

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[1] $EI = \frac{\text{Enrollment in Forms I-III}}{\text{Enrollment in Standards I-VI}} \times 100$ This index would have a maximum value of 50 if there were no dropouts, repeaters or deaths of school children, and the numbers in each grade, Standard 1 through Form III, were the same. In practice, however, the index could not reach the theoretical maximum without migration of children from one area to another. Primary to secondary progression rates (in percent) are about 5-10% higher than twice the enrollment indices.

Appendix I

Although large inequalities, as expressed by social and economic variables, exist and their elimination remains the priority goal, these are approached as geographical inequalities - differences between areas rather than between groups or individuals. Within areas there is a variable mix of rich and poor, ethnic Malays and non-Malays, but the area averages for these mixes represent a summary EI. The thirteen states have been used in the past as the unit of account and interstate variations in many indices, including the enrollment index, have been identified. Yet the states are large and there are usually large variations within each. The district (there are 88 districts in Malaysia) is a more homogenous unit and therefore more valid as the unit of account in the identification of inequality. The use of the district rather than the state also enables a better differentiation between rural and urban areas, known to be an important variable in lower secondary enrollments.

Certain disadvantages to using the district must also be noted. At this scale of disaggregation, the possibility of daily commuting across district boundaries is higher than it is across state boundaries, so that the possibility exists of children attending primary school in one district and attending lower secondary in another district, as catchment areas straddle the boundary. In addition, the presence of boarding schools, with a large effective catchment, will increase the amount of inter-district mobility. Migration can thus affect the value of the enrollment index for some districts especially where they are small. Nevertheless, this will affect only a small proportion of total enrollments, and in no way destroy the essential value of the enrollment index for planning purposes. The enrollment index for each district was used in this project as the basis for the identification of the extent of inequalities in lower secondary provision and for allocating additional places to remedy existing and projected deficiencies.

Perlis, Malacca and Penang, all small but highly urbanized states, have been identified as having the highest state EIs (Table B2). Sarawak falls well below the rest of the country, and Pahang, Selangor, Johore and Trengganu are the least well provided peninsular states. The range of district EIs is larger, from over 50 (Perlis), through the second highest 46.5 (Rembau, Negeri Sembilan), to 17.4 (Division Seven, Sarawak). There are 22 districts below the national mean of 34.3, and a histogram of the values confirms the slightly negatively skewed distribution [Figure 1(a)]. Within each state the range of values may also be large. In Kedah, for example, one of the states of great apparent need, EIs range from 45.2 (Kota Setar, containing the state capital and largest town) to 19.3 (Sik) and 20.4 (Padang Terap). Maps 1(a) and 2(a) illustrate a similar pattern within many states. Variation in this index, and in others, such as examination pass rates, teacher qualifications, is greater within states than it is between them.

Provision is being expanded in developments financed directly through the Third Malaysia Plan (TMP). The expansion of lower secondary enrollments in the TMP seeks to redress existing inequities and provide additional places in poorly provided areas. The overall expansion is considerable (214,000 places including the upper secondary level), and some of the TMP places have already been built and occupied (Table B2). Altogether, a net addition of some 100,000 places in lower secondary forms is planned and financed through the TMP for 1977-80, raising national enrollment rates in this sector from 72.5 in 1977 to 76.5 in 1980. Allocations of these places were made to each state on the basis of requests from state officials, with a variable proportion of the requests being met.

Additional capacity went to all but six of the 88 districts of Malaysia. The frequency distribution of EIs, 1980, is similar to that of 1977, but with some interesting differences (Figure 1). There are fewer districts with an EI of less than 25, as many places were allocated, as expected, to the poorest districts. There are 16 districts more than 20% below the national mean EI of 35.7, six less than in 1977. However, the index fell for most of the districts of Sarawak, with Division 7 (14.8) the lowest in the country. But there are seven districts with an EI of 47 or more, compared with only one such district in 1977. Additional places have evidently been allocated to some of the most advantaged districts. The example of Kedah again serves to illustrate the point, for the EIs of Sik and Padang Terap both rise substantially to 27.7 and 29.1 respectively, but there is also a large increase in Kota Setar (to 49.6). The national pattern is similar to that in 1977 [Maps 1(b) and 2(b)].

The allocation of TMP places fails to meet the equity objective set out in policy. The allocations within each state were most probably a response to a perceived need (felt by local officials in terms of reducing overcrowding and double-shifting and eliminating "floating" classes, needs that are more evident in urban areas than in rural areas) and not in terms of the real absolute need to provide places where they are presently insufficient, even with double shifting, etc. A response to local political pressure is also likely to have been a factor. It would be thoroughly misleading to imply that equity criteria were not taken into account, but these were not pursued as vigorously as they were thought to have been, particularly in the states themselves.

The TMP allocations that have been made are expected to be completed and places available for the 1980-81 school year. The aim of universal lower secondary education will not have been achieved by then, however, and further developments beyond 1980 must be planned. In the short term fairly accurate projections may be made to 1982 because the students then in forms I-III are already now in the primary school. This planning horizon may see the fruition of plans financed through Malaysia V.

The demand for further expansion to 1982 is generated partly by a growth in numbers in primary school, and partly by a desire to increase even further the proportion of the primary school graduates who proceed to secondary school. Thus a key problem was to estimate the additional capacity required by 1982. This was done by cohort analysis. The cohort that was in standard I-III of primary school in 1971 was in forms I-III of secondary schools in 1977. Of those who were in standards I-III in Peninsular Malaysia in 1971, 73.1% had progressed to forms I-III in 1977 (Table B3). If the cohort in standards I-III is to fill the places to be provided in 1980 the progression rate will improve to 80.3%. At that progression rate there will be a demand for 658,000 places if the progression rate were to improve by 5% to 84.3%. A progression rate of 84.3% is approaching a ceiling, given the dropout during the six intervening years, a small adjustment for mortality and considerable interdistrict variations in the EIs on the peninsula. (Progression rates will be much higher in some districts than in others.) Further expansion above the 1980 level can only be in the presently less well-serviced districts if the allocation of additional capacity is to be reflected in additional enrollments, and not in qualitative improvements through the reduction of overcrowding. The overall additional need for Peninsular Malaysia would thus be somewhere between 13,500 and 46,300 places, corresponding to standard 1 to form I progression rates of 80.3%, respectively. Similar estimates were made for Sabah and Sarawak, but with different (lower) progression rates.

The overall enrollment needs for 1982 were calculated from these cohort data for Peninsula, Sabah and Sarawak separately, and compared to the projected enrollments for 1980 (Table B3 and B4). On the assumption that these improving progression rates hold there would be a demand for 62,000 additional places between 1980 and 1982. However, if progression rates do not improve the need would be as low as 20,000 places. Malaysia V therefore sought to provide an allocation somewhere in this range, moderated, however, by equity considerations as required by the project objectives.

The distribution of the additional places in the proposed World Bank project was premised on the need to allocate to those districts where the need is greatest, i.e. those with the lowest enrollment index as calculated for 1980. The target districts are those below the national average (mean) of 35.7. For each of the 49 districts below the national mean, the difference between projected enrollments, 1980, and the enrollment required if the District was to reach the national mean was calculated. Actual allocations brought the proposed capacity up to or near the mean, being rounded to allow for a certain institutional constraint imposed by the need to provide schools with 40 pupils per class and a minimum of three grades, forms I-III. The smallest school is of four streams in each grade (total enrollment 480) and the largest eight streams (total enrollment 960). Some smaller extensions to existing schools were also made in special circumstances. While many of the proposed schools are 6-8 stream schools, every effort was made to provide more small schools rather than fewer but larger schools, because the majority of the new places are needed in rural areas. The likelihood of a sufficiently large population living within an acceptable catchment area is higher for a small school than it is for a large one. This also keeps down the need for expensive boarding facilities. (The unit recurrent cost in a fully residential secondary school is about four times as high as in an ordinary secondary school.) However, in low density rural areas, particularly in Sarawak and Sabah, but also in Kedah, Kelantan, Pahang, Perak and Trengganu, some boarding facilities and teacher housing are required.

Reducing the size of schools represents a change in thought from previous attempts to provide schools in rural areas. A study of drop-outs in 1972 recommended further development of boarding in rural areas as a consequence of its advocating large educational complexes. These complexes would have the advantages of greater social class and community mix than is presently the case in small rural schools, and would have a beneficial effect on the performance and morale of teachers. However, a change in emphasis is evident in the stated need to spread more schools into rural areas, to give more direct access to rural children as day pupils - of moving schools to the pupils, rather than pupils to the schools. In very low density areas, notably in Sabah and Sarawak, but also in some Peninsular States, boarding cannot be avoided, but every effort must be made to reduce its present importance where possible.

An allocation of 46,100 places is proposed, of which 71% are in nine of the states of Peninsular Malaysia (Table B5). Places are allocated to 44 districts with total additions ranging from 2,888 to extensions of 256 places in two small districts with low enrollment indices but low total need. The allocations are summarized by state in Table B6, and the distribution of the resulting indices is illustrated in Figure 1(c) and Maps 1(c) and 2(c). The frequency distribution is very different to that for 1980, with the lower half moved up to or near the mean; the upper half is virtually unaltered. The proposed allocation of these 46,100 places thus brings about a major change in the overall distribution of lower secondary opportunity. There are now only five districts with EIs more than 20% below the mean of 37.9. The equity impact of the recommendation is further confirmed in a comparison of the Gini coefficients 1/ of the distribution of EIs for 1977, 1980 with TMP construction and finally with the proposed project allocations. Whereas the addition of a large number of places between 1977 and 1980 had little impact on the Gini coefficient, and that was in the direction of greater inequality, the addition of about half the number makes a great impact (Table B7).

Inequalities remain, however, and the addition of further capacity could reduce the Gini coefficient further, but the marginal increase in equality with each additional 1,000 places would be small and declining. There are, however, other factors to be taken in account. With the addition of the recommended 32,800 places in the Peninsula the progression rate, standard I-III, 1976, to forms I-III, 1982, would rise to 82.7%. The recommended expansion in Sabah is small, but consistent with the possible improvements in progression rates. Sarawak would receive 10,560 additional

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1/ The Gini coefficient is a measure of the degree of inequality in the distribution of two variables, for instance, the total number of children and the number of children enrolled (by geographical area, income, etc.). It ranges from 0.0 for absolute equality to 1.0 for absolute inequality.

places, the largest of any state, but it would still lag well behind the rest of the country. Allocations beyond 10,560 would necessitate the raising of the progression rate for the 1976 standard I-III cohort over 10% above the 1980 rate, and would require an overall expansion of lower secondary enrollments in certain districts of more than 10% p.a., 1980-82. There is already a major primary school building program underway in the state and further additions might extend the implementation capacity too far. The 6,800 boarding places that are proposed comprise a higher proportion in boarding (64%) than was found in Sarawak in 1977 (57%). This is necessary as a direct consequence of the Bank financed expansion (Malaysia IV) of primary schools in some of the most remote parts of the state, for if the children who will attend these schools are to progess to secondary school, there will be even greater need to provide boarding. There would be continued need for expansion in Sarawak beyond the project period.

The principal contribution of systematic SLP in Malaysia V was not simply to identify variations in access to lower secondary education and to allocate places to rectify them, but more importantly to identify the barriers to achieving the desired goal of equality of opportunity. Thus the established allocation process - of considering inter-state rather than intra-state variations - was shown to have had only limited impact on goal achievement. The need for a finer level of spatial aggregation was made evident. Understanding the processes by which allocation decisions are made is a prerequisite to understanding the spatial patterns that emerge and consequently to developing an appropriate planning methodology.

Table B1

MALAYSIA

Enrollment Rates and Enrollment Index

	Enrollment rate Primary 1976		Enrollment rate Lower sec. 1976		Enrollment index 1977		Enrollment index 1980	
	(%)	Rank	(%)	Rank	(%)	Rank	(%)	Rank
Johore	83.0	7	74.0	6	33.8	5	33.7	2
Kedah	78.9	2	68.6	4	35.1	8	39.5	10
Kelantan	83.2	8	76.6	9	36.5	9	38.2	7
Malacca	76.5	1	75.5	8	41.3	12	46.8	12
Negeri Sembilan	79.8	4	77.2	10	38.9	10	42.3	11
Pahang	92.2	11	74.2	7	31.0	2	34.9	4
Perak	80.5	5	71.5	5	34.2	7	34.4	3
Perlis	82.6	6	81.4	13	57.7	13	56.4	13
Penang	79.1	3	80.7	12	39.6	11	38.7	8
Selangor	87.8	10	80.0	11	33.8	4	35.4	5
Trengganu	86.3	9	63.6	2	34.0	6	39.4	9
Sabah	92.2	11	66.8	3	32.4	3	35.4	6
Sarawak	95.3	13	57.1	1	25.3	1	24.8	1
MALAYSIA	84.5		72.5		34.2		35.7	

Note: Rank 1 represents the least favorable value, rank 13, the best. Enrollment rate for lower secondary includes the remove class. Net enrollment rates are somewhat lower.

Source: Enrollment rates are taken from UNESCO Report EFM/86 "The Reinforcement of Education and Manpower Development in Malaysia" 1977, Annex 41.

Table B2

MALAYSIA

TMP Additions for Lower Secondary Schools

	Total class-rooms to be built	Total places (40/class)	Places occupied 1977	Net additions 1977-80	Places for lower secondary	Enrollment in borrowed premises	Net TMP lower secondary additions (LSA) 1/
Johore	415	16,600	4,240	12,360	8,034	4,280	6,474
Kedah	663	26,520	4,960	21,560	14,014	2,808	12,610
Kelantan	466	18,640	6,480	12,160	7,904	4,258	5,878
Malacca	277	11,080	960	10,120	6,578	-	6,578
Negeri Sembilan	313	12,520	3,400	9,120	5,928	-	5,928
Pahang	376	15,040	3,720	11,320	7,358	808	7,203
Perak	486	19,440	6,520	12,920	8,398	-	8,398
Perlis	66	2,640	1,680	960	624	-	624
Penang	163	6,520	2,280	4,240	2,756	-	2,756
Selangor	797	31,880	7,680	24,200	15,730	4,611	13,424
Terengganu	279	11,160	1,080	10,080	6,552	-	6,552
Sabah	531	21,255	1,568	19,687	12,794	8,733	8,427
Sarawak	516	20,640	3,320	17,320	11,258	5,280	8,618
	5,348						
TOTAL:	5,348	213,935	47,888	166,047	107,928	30,778	93,470

1/ Total of district estimates for which LSA is taken as "places for lower secondary" less half of "enrollment in borrowed premises." Negative LSA were accounted as zero in the district estimates. State totals do not therefore strictly follow this formula.

Table B3

MALAYSIA

Progression Rates of the 1971, 1974 and 1976 Standard I-III Cohort to Lower Secondary School

	Standard I-III		Lower Secondary I-III	Progression rates (from standard 1 to form I)
Peninsula	777,756 in 1971	became	568,883 in 1977	73.1%
	803,763 in 1974	is projected to become	645,308 in 1980	80.3%
	820,415 in 1976	would become @80.3%	658,800 in 1982	
	" " "	@84.3%	691,600 in 1982	
Sabah	63,441 in 1971	became	41,507 in 1977	65.4%
	65,590 in 1974	is projected to become	49,934 in 1980	76.1%
	68,255 in 1976	would become @76.1%	51,900 in 1982	
	" " "	@80.0%	54,600 in 1982	
Sarawak	80,781 in 1971	became	47,742 in 1977	59.1%
	94,994 in 1974	is projected to become	56,360 in 1980	59.3%
	102,525 in 1976	would become @59.3%	60,800 in 1982	
	" " "	@66.0%	67,700 in 1982	
Total for Malaysia	921,978 in 1971	became	658,132 in 1977	71.4%
	964,347 in 1974	is projected to become	751,602 in 1980	77.9%
	991,195 in 1976	would at above mentioned	771,500 in 1982	77.8%
	" " "	progressive rates become	813,900 in 1982	82.1%

Table B4

MALAYSIA

Demand for Lower Secondary Places, 1982

	Effective demand for Form I-III places, 1982		Form I-III enrollments 1980	Extra places to meet 1982 demand	
	At 1980 progression rates	At revised progression rates		At 1980 progression rates	At revised progression rates
Peninsula	658,800	691,600	645,300	13,500	46,300
Sabah	51,900	54,600	49,900	2,000	4,700
Sarawak	60,800	67,700	56,400	4,400	11,300
MALAYSIA	771,500	813,900	751,600	19,900	62,300

Note: A minor additional demand may arise from growth of the Form Remove enrollment. Enrollments in this class are small in all areas except in Sarawak as shown by the following projected enrollments for 1980.

	Form I-III enrollments	Form remove enrollments	Total lower secondary enrollments	Form remove as fraction of total
Peninsula	645,300	69,110	714,400	9.7%
Sabah	49,900	3,500	53,400	6.6%
Sarawak	56,400	11,000	67,400	16.3%
MALAYSIA	751,600	83,600	835,200	10.0%

MALAYSIA

Mission Allocations and Progression Rates

	Projected enrollment in Form I-III, 1980	Minimum need at 1980 progression rates	Proposed allocation	Lower secondary enrollment after project allocation	Effect on standard 1 to form I progression rates, 1980-82 (%)
Peninsula	645.3	13.5	32.8	678.1	from 80.3 to 82.7
Sabah	49.9	2.0	2.8	52.7	from 76.1 to 77.2
Sarawak	56.4	4.4	10.6	66.9	from 59.3 to 65.3
MALAYSIA	751.6	19.9	46.1	797.7	from 77.9 to 80.5

Note: Figures may not add due to roundings.

Source: Table 5 and Appendix 1.

Table B5

Table B6

MALAYSIA

Proposed Allocations by State

	Enrollments	Schools	Hostel Places	Quarters 1/
Johore	8,160	12	0	0
Kedah	3,616	6+1 ext.	260	6
Kelantan	1,712	2+2 ext.	400	6
Malacca	0	0	0	0
Negeri Sembilan	480	1	0	0
Pahang	3,136	5+1 ext.	500	35
Perak	5,880	8+1 ext.	100	9
Perlis	0	0	0	0
Penang	960	1	0	0
Selangor	6,960	10	0	0
Trengganu	1,920	3	300	10
Peninsula	32,824	47+5 ext.	1,560	66
Sabah	2,760	5	1,360	59
Sarawak	10,560	19	6,800	307
Sabah/Sarawak	13,320	24	8,160	366
MALAYSIA	46,144	71+5 ext.	9,720	432

1/ The allocation of quarters is tentative and will be revised before negotiations.

Table B7

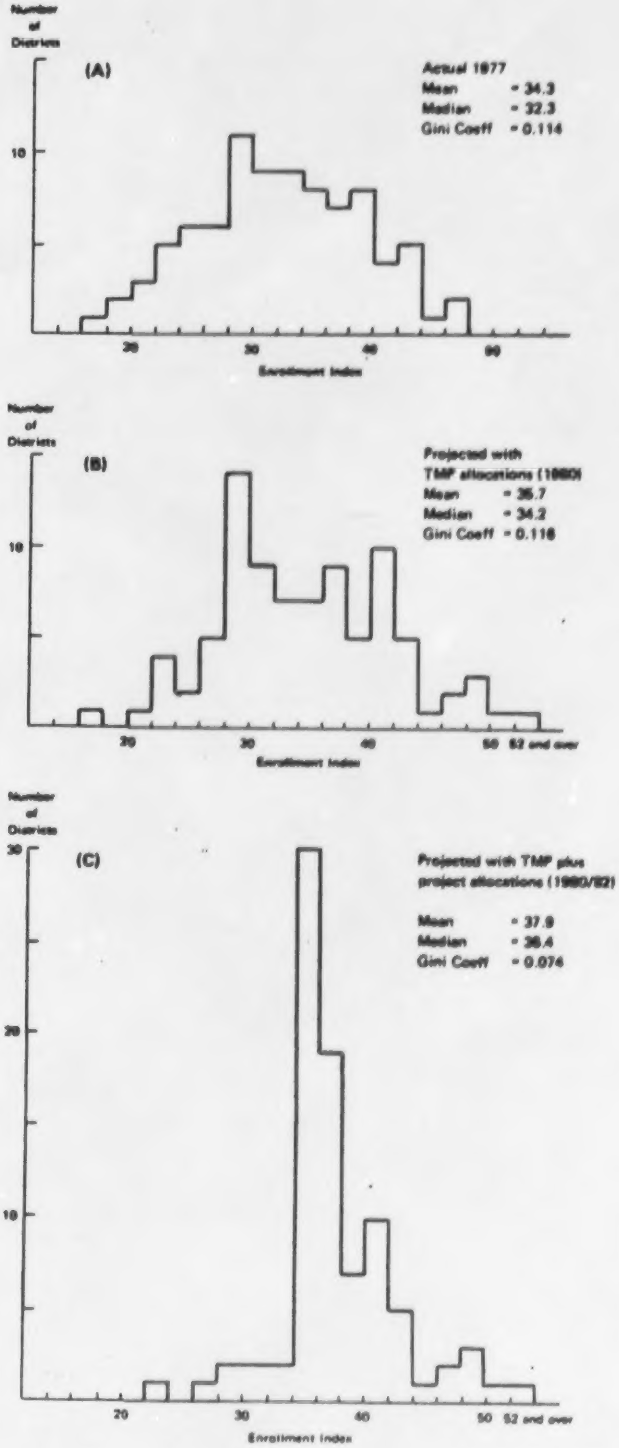
MALAYSIA

Form I - III Enrollments and Gini Coefficients, 1977, 1980 and 1982

	Form I-III enrollments	Net TMP addition	Mean	Median	Gini coefficient	Proportion to Peninsula
1977	658,132		34.21	31.98	0.1141	
1980						
1980 (1977 + TMP)	751,602	93,470	35.70	34.22	0.1156	81.6
1982 (1980 + proposed additions)	797,745	46,144	37.89	36.44	0.0746	71.1

Figure 1

MALAYSIA
PROPOSED FIFTH EDUCATION PROJECT
DISTRIBUTION OF LOWER SECONDARY ENROLLMENT INDICES



World Bank - 18540

MAP 1(A)

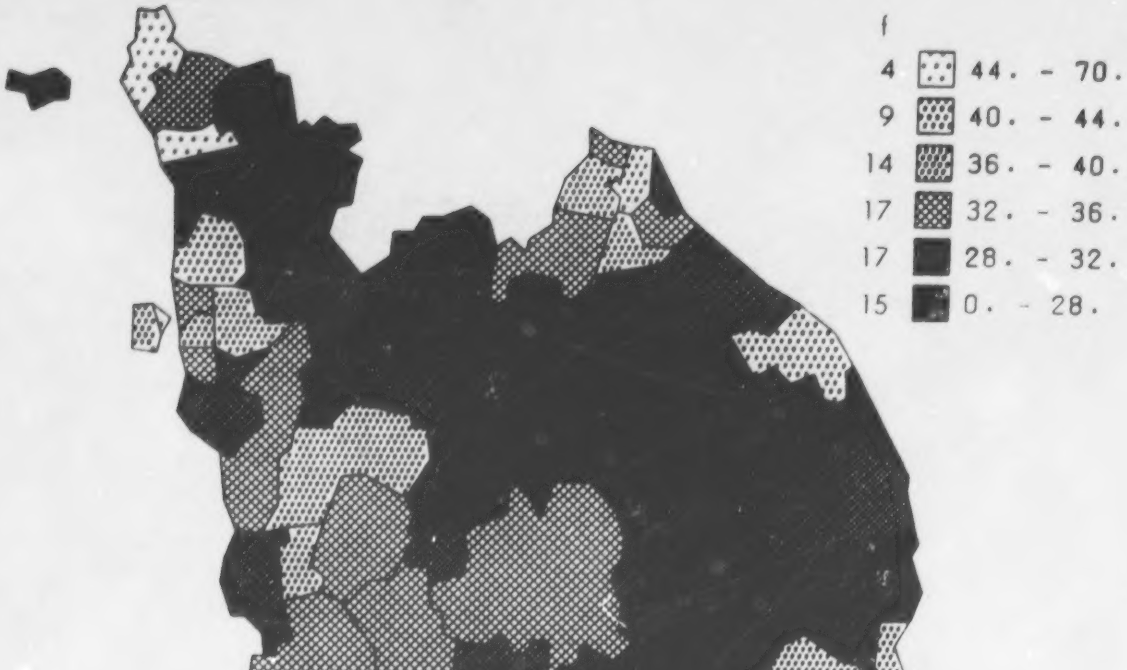
IBRD A13430-5

JANUARY 1978

MALAYSIA

, PENINSULA

ENROLLMENT INDEX 1977



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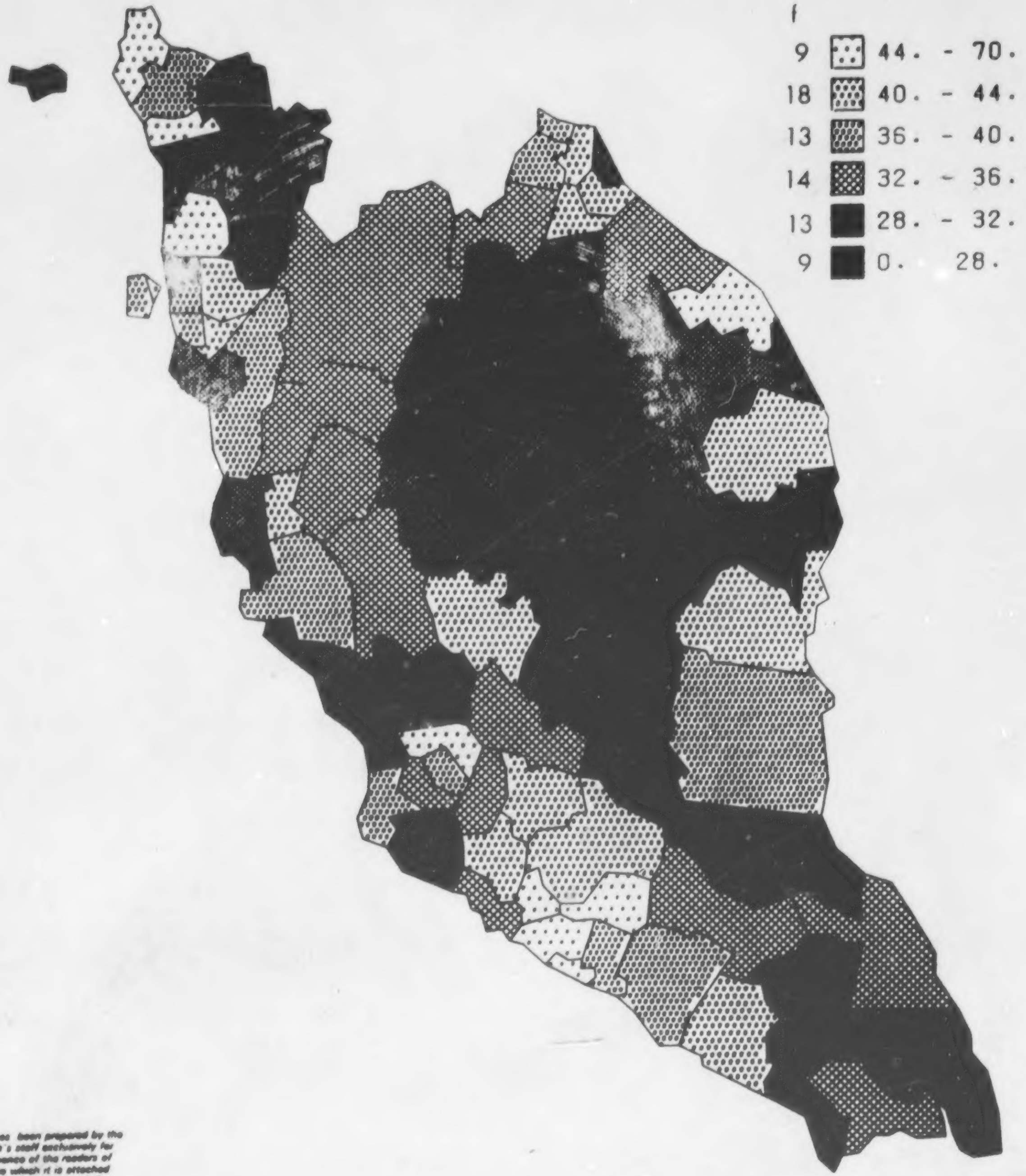
IBRD A13430-6

JANUARY 1978

MALAYSIA

PENINSULA

ENROLLMENT INDEX 1980



f		
9	⛆	44. - 70.
18	▨	40. - 44.
13	▨	36. - 40.
14	▨	32. - 36.
13	■	28. - 32.
9	■	0. 28.

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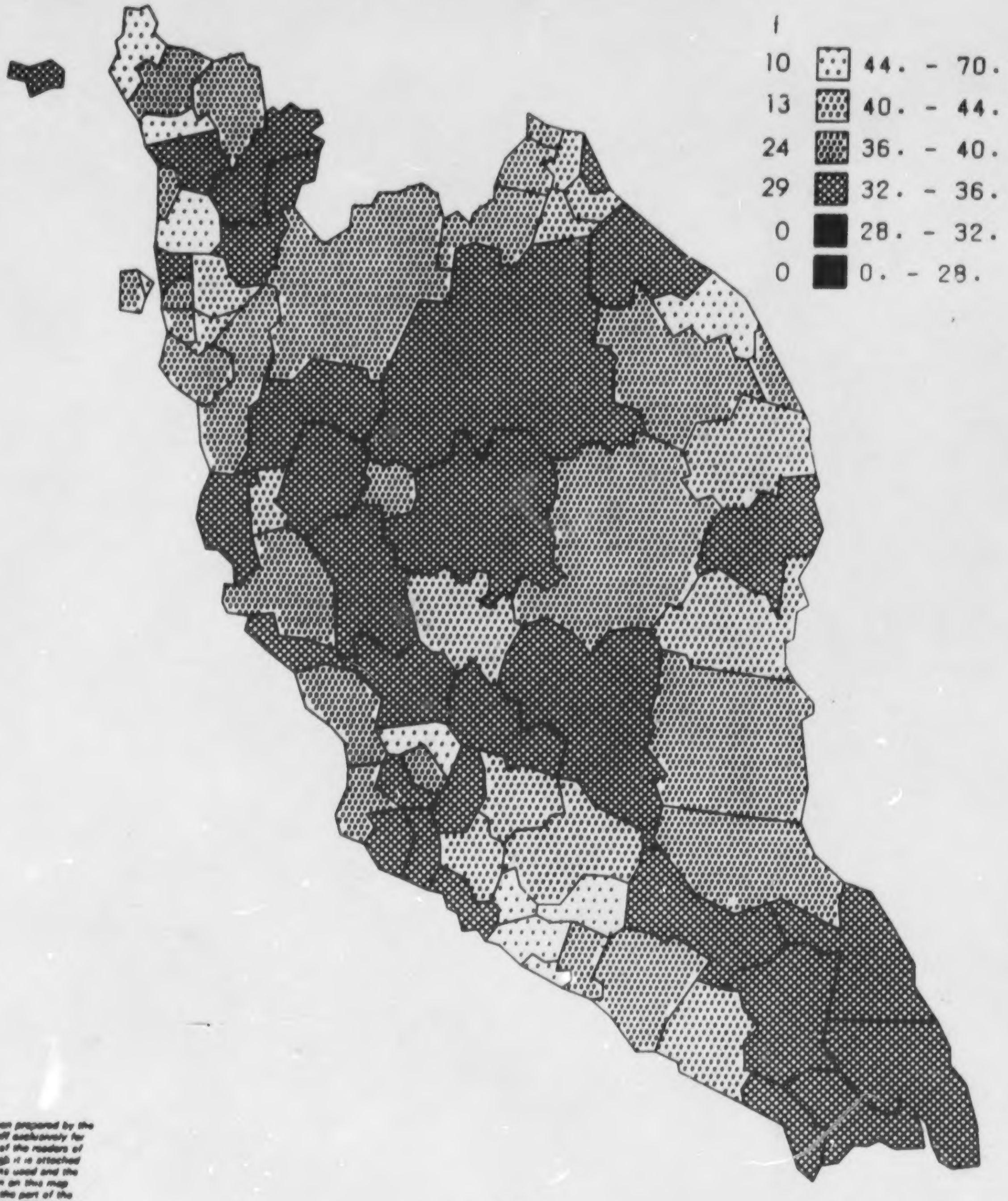
MAP 1(C)

IBRD A13430-7

JANUARY 1978

MALAYSIA
PENINSULA
ENROLLMENT INDEX WITH PROJECT ALLOCATIONS



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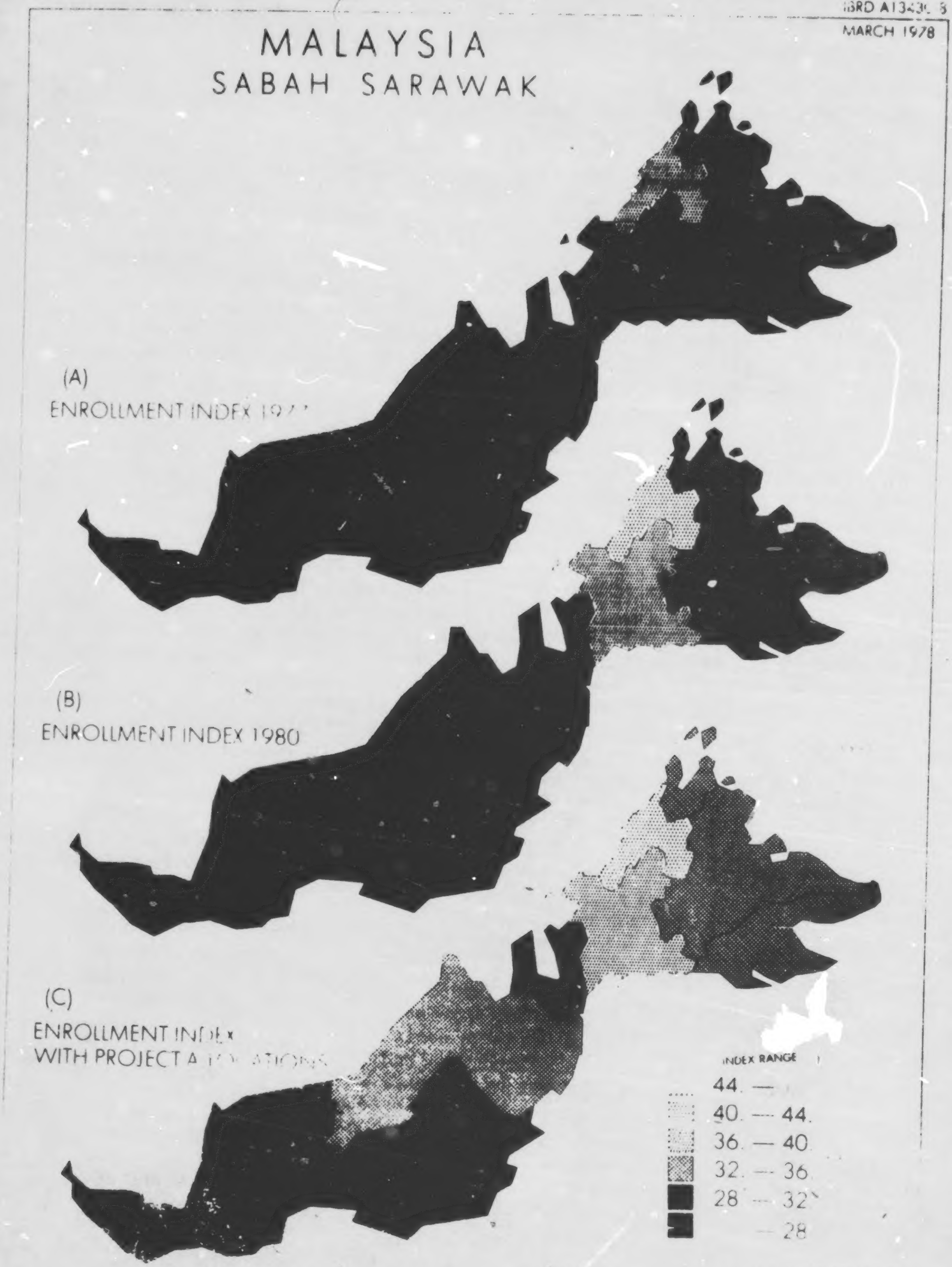
Map 2(A), (B), (C)


IBRD A13430.5
MARCH 1978
MALAYSIA
SABAH SARAWAK
(A)
ENROLLMENT INDEX 197
(B)
ENROLLMENT INDEX 1980
(C)
ENROLLMENT INDEX
WITH PROJECT ALLOCATIONS
INDEX RANGE
44. —
40. — 44.
36. — 40.
32. — 36.
28 — 32
— 28

C. HONDURAS: THE NUCLEARIZATION CONCEPT

The Second World Bank Education Project in Honduras was appraised in July/August, 1977, and an IDA credit of $5 million became effective during 1978. The main thrust of the project is in the improvement of the efficiency and quality of rural primary education, principally through support to 40 school nuclei, comprising 588 schools, affecting about 45,000 primary school students. The strategy of supporting improvements in rural primary education through nuclearization programs is one that has been pursued in several Bank financed projects in Latin America, beginning with Dominican Republic II in 1976 and including Paraguay, Nicaragua, Bolivia, Guatemala and El Salvador. This description and analysis of the SLP concepts and methodology in Honduras II has, therefore, a general applicability in the Region as a whole.

In Honduras in 1976 about 80% of the school-age group attended primary school (about 90% if over-age pupils are included), but only 30% of the first grade entrants completed the full six grade primary cycle, and there are large disparities in initial access and promotion rates between urban and rural areas. It takes 9.3 student years to produce one sixth grade graduate from urban schools, but 19.5 student years from rural schools. Among the major reasons cited for such a discrepancy are the large number of schools offering less than the full six grades and the long distances that children have to walk to gain initial access to the system as well as to a school that offers the upper classes. In order to improve the situation the government has, since 1973, been experimenting with nuclearization of primary schools as an approach to organizing and supervising the system, to increase access and to integrate the schools more fully into the life of the community. Seventy-two "pilot" nuclei were developed throughout the country, but these have met with only limited success. The nuclei were not defined with respect to the community but to the existing education system, and a network of central and satellite schools was evolved with five satellites for each central school. Appropriate training in new educational strategies was not given to directors or teachers, and administrative procedures were not clearly defined. The impact on improving basic enrollment retention and promotion rates and on classroom activities was minimal.

The Government is presently developing policies to correct these deficiencies and plans to revise the legislation now governing the organization and administration of the school nuclearization system, as a basis for enlarging its experimental program with IDA assistance under this project. In this new scheme each nucleus is a technical and administrative unit. It serves 1,000 to 1,400 students, taught by 15 to 20 teachers on a double shift basis. A "central" six grade school is linked to a number of neighboring schools which may have six ("subcentral" schools) or four grades ('associated" schools). The central school has, in addition to classrooms, a small workshop and a covered multipurpose space for providing accelerated primary education (three years of schooling equivalent to the six years of the formal system) to youths and adults, as well as literacy courses, some farmer training, short courses in community development and in home economics. Walking distances to schools for children are no greater than three kilometers. Double shifting and multigrade techniques are used extensively, especially in sub-central and associated schools.

The Director of each central has no teaching responsibilities. He is responsible for supervising all schools in the nucleus (averaging about 14), and serves as the liaison between the community and the nonformal training agencies. Project rural schools are to be staffed with qualified teachers who have successfully completed in-service training courses on rural basic community education under a school nuclearization system. The Ministry of Education will assign a teacher trained in multigrade teaching techniques for each group of about 35 students, regardless of grade, if working one shift and for groups of about 70 each if working two shifts. To attract and retain competent teachers for project schools, rural teachers are permitted to work two shifts, with salaries adequate to compensate them for such increased teaching responsibilities (160% of normal for teaching two groups).

However, the most fundamental change in this revised concept of the "nucleo" is in the definition of the area to be included. The area is now defined in the first instance as a functional region, with a relatively homogeneous and cohesive social and economic structure. Patterns of school provision are to be related to this socio-economic reality. Patterns of population distribution and growth are considered in considerable detail, current and projected economic activities are ascertained, and together with existing data on the education provision they provide the asis for a diagnosis as a preliminary to restructuring the pattern of schools. The maximum size of the area of the nucelo is determined by that area that can reasonably be supervised by the Director, travelling on foot. He is expected to visit each school at least twice each month. Teachers are expected to travel in to the central school when necessary for in-service training, to collect equipment, etc. On the other hand, the journey to school by the pupil is minimized. The threshold is lowered through multigrading, and the allocation of teachers is according to the total number of children in a small area and not the number in each grade in that area. The multigrade teaching is supported by a parallel program of in-service training financed in the project, and organized with the assistance of a specialist from Uruguay a country where multigrade teaching in rural schools is common.

The project creates and supports 40 such nuclei. All except seven are in four Departments in the south of the country. These Departments have enrollment ratios at near the national average, but are areas in which there are recent changes in the local distribution of population as well as inmigration. Departments that are economically and educationally more developed were avoided in part for equity reasons, but also because other agencies were involved in educational programs; the poorest Departments were avoided partly because they are, in the absence of rural development schemes, areas of outmigration and partly because the possibilities for successful innovation of the revised concept were less certain. Municipalities, sub-divisions of the Department and the lowest levels of the administrative hierarchy, were identified within each Department and surveyed to identify cohesive units which would be appropriate for school nuclei. Throughout the whole municipality a schools inventory was carried out and related to other population and development data to identify in general terms the needs of the school system in each area identified as a nucleo. Within each nucleo, based in the designated center schools, a consultation process was instituted to identify in detail needs of each community. This involved all levels of participation in education, including the teachers and parents. A methodology for estimating local population distribution and growth was also developed in consultation with local officials of Education and other ministries.

The data of the schools inventory and the information derived in the local consultation process were brought together to formulate proposals for school expansions in each nucleo, and these proposals were further submitted to the local communities for comment. In the 40 nuclei in the project a total of 853 classrooms in 558 schools are affected, of which 545 are to be constructed, equipped and furnished (80 in central, 363 in sub-central and 102 in associated schools), and 308 equipped and furnished only. There will be 77 new schools, and extensions to a further 45. The buildings of 269 schools will be replaced with new construction. Besides classrooms, each central school will have facilities for teaching science and practical subjects, a school library and an administration area. Sub-central and associated schools have a workshop and storage area, and all schools have a covered area for community activities.

Generalizing this revised concept of nuclearization to the rest of the country is to be supported in the project itself, and finance is included for operational support (field work costs and payment to informants) in the rest of the country. In addition technical assistance for twelve man-months is to be hired to coordinate the program and to offer advice where needed. This general program will not begin until six months after the main building program has started in the 40 original nucleos. This will allow further review and possible revision of the methodology in the light of experience and early implementation. It is expected that the work will be complete within 12-15 months. The process of generalizing the methodology is expected to have a major impact on educational planning in Honduras, as the nucelo becomes the basic unit of educational administration, supervision and planning.

An approach to planning primary education in rural areas through nuclearization similar to that described for Honduras has been applied in other Latin American countries, premised on the assumption that the basic planning unit must be defined in functional geographical terms, as a socio-economic entity. This area is taken as a given and plans are developed accordingly, and not vice versa. This represents a major change in educational planning, for it implies that the delivery of education cannot be circumscribed only or even initially by the institutional constraints of the established education system, but rather has to be a function of given socio-economic circumstances. In Honduras nuclearization has meant the redefinition of two of the major institutional norms - of threshold and range. Thresholds were reduced as schools could be much smaller than the previous norm, not by default, as had been the case previously, but through an acceptance of multigrading and planning positively to implement it. The range was reduced as distances that children were expected to travel to school were minimized. In principle the school was brought to the children and not the children to the school. The methodology also has a major impact on institution-building in the education sector for it necessitates the development of a planning capacity at the local level, within the nucleo. SLP thus becomes a matter for community involvement and decision.

D. BURUNDI: AN EQUITY STRATEGY

The first IDA Education project in Burundi was appraised in February - March, 1976, and credit effectiveness began during 1977. The main component in the project is the construction of 100 Centres de Formation Polyvante (CFP) which are essentially primary schools, but have a workshop attached to the regular classrooms. The purpose of the project was to expand enrollments in primary schools through the CFPs (with a total additional enrollment of 27,000), as well as consolidating curricular reform in the introduction of practical and rural subjects.

From the time of its initial identification the principal issue in the project was equity. Given the traditional and recent history of intertribal strife and differential ethnic opportunity in Burundi, would it be possible to satisfy the Bank's lending criteria with a project that would seek to promote equality of educational opportunity? It was known that opportunity to attend school and to progress within the educational system were grossly unequal, with the ruling ethnic minority having much better opportunities than the depressed majority. However, a direct approach to the ethnic issue by providing places only for the minority was clearly unacceptable to the Borrower.

In its request to the Bank for finance for the project the Government proposed to distribute the schools on a one-per-commune basis in principle (there are 78 communes and only 80 schools were proposed in the original request). Had the CFPs been complements rather than supplements to the existing system such a proposal would have been more worthwhile, but the effect of allocating on this basis would be to maintain existing inequalities, communes with already high levels of enrollment receiving as much as those with low levels of enrollment, and regardless of the total population of the commune. However, it was felt that the CFPs could have some demonstration effect and that some allowance for this could be made. It was agreed during appraisal that two CFPs were allocated to each 17 of the 18 arrondissements (Bujumbura, the capital city was excluded as it was recognized to be over-provided) and, in addition, one each to the nine largest rural arrondissements to satisfy this possibility, which in part also satisfied the original request of the Government.

The geographical distribution of schools, therefore, had become the major question, and the ethnic issue was subsumed within it. The differential distribution of the two ethnic groups was reflected in the distribution of school enrollments, with highest enrollment rates in those areas with the highest proportion of the ruling minority. An equity strategy would therefore be to promote the equalization of the inter-district enrollment rates, thereby differentially assisting those areas with the highest proportions of the majority ethnic group. What had begun as a social issue which had its geographical manifestations could be tackled initially from a geographical standpoint.

The remaining 57 CFPs were to be allocated to promote equity. The criteria on which this allocation was done was solely, in the absence of data on economic indices or ethnic distribution by *arrondissement*, that of the enrollment ratio (the enrollments in primary school as a proportion of the total in the relevant age group). The calculation of this ratio for each *arrondissement* was a considerable problem in its own right:

(a) enrollment data were available by *canton scolaire*, which in no case corresponded exactly to the administrative *arrondissement*. The discrepancy has arisen as a result of past educational developments in the growth of a system of central schools and *succursales*, branch schools which were not necessarily in the same *arrondissement* as the central school, but which were considered for administrative purposes as being in the same *canton scolaire*. The raw data for each school had to be reaggregated by administrative *arrondissement*;

(b) population data for Burundi are lacking in quantity and quality since Burundi has not had a census since Independence, and public disruption and large scale emigration and warfare over the last 15 years have caused major changes not only in the size of the population, but also and more importantly for school location planning in the distribution of the population. Best available distributional data are derived from the *Etat Civil*, general estimates of population totals by sex and by age groups (0-14; 15 and over). More detailed data on age structure and growth patterns were derived from surveys and have been used to make population projections, including school-age populations, by *arrondissement* as part of preparations for the 2nd Five Year Plan.

Enrollment ratios were calculated at appraisal for 1976 for each *arrondissement* and used as the basis for defining need and allocating 45 of the remaining 57 CFPs. Several alternative distributions were suggested, and the final allocation was mutually agreed between the Borrower and the Bank. It represents a compromise between the Bank's desire to promote an even greater equity effect and the Borrower's wish to have a more even spread per commune. Seven *arrondissements* received no schools, while the least developed *arrondissement* received ten schools (Table D 1). The allocation of the remaining 11 CFPs was delayed until late 1977, after the project had started and when new enrollment and population data had become available. Allocations were then increased in eight *arrondissements* and the overall effect was to further enhance the equity impact.

Concern for the inter-*arrondissement* allocation was matched by concern for the location of the project schools within each *arrondissement*. Problems of data are even more serious at the local scale, as neither satisfactory base maps nor sufficiently detailed population data are available.

Thus the compilation of a map showing the distribution of schools in any canton scolaire could only be done roughly. The local population distribution could be best ascertained from local knowledge and experience of the local education and other officials, and general areas of relative under/over-provision could be identified for each commune, the sub-division of the arrondissement. Local officials were advised of the number of CFPs allocated to each arrondissement and were asked to suggest sites on the basis of a suggested set of criteria - the distribution of existing schools, the distribution of population, possible development schemes, water supply and the availability of building materials. The sites suggested were then reviewed in the field by the PIU staff. In most cases these were found to be satisfactory, but in others modifications were made.

The case of Burundi I brought SLP into the midst of political controversy, but was used to resolve what might have been a basic impasse between the priorities of the Borrower and those of the Bank. A geographical approach will not in itself solve the ethnic question, but will enhance the possibilities for equalizing initial opportunities to attend school. In the short term the project was made possible by the systematic consideration of the location of its components. In the longer term it is likely that the principal impact of the approach will be a more general awareness by officials of the Ministry of Education of the nature and extent of disparities in educational opportunity in Burundi. In the current spirit of reconciliation between the two ethnic groups a methodology to reduce the disparities is not only available but may be used. The attitude of the Government to SLP is now positive, but in Burundi the whole apparatus of educational planning needs to be strengthened considerably, especially in the area of data collection and use, before SLP can begin to be a regular and familiar exercise in the work of Ministry and field officials.

Table D1

BURUNDI

Allocations of CFPs by Arrondissement

Arrondissement	Demonstration Effect	Equity Effect		Total
		At Negotiations	During Supervision	
Bubanza	2	0	0	2
Cibitoke	2	3	0	5
Bujumbura	0	0	0	0
Mwisale	3	0	0	3
Bururi	3	0	1	4
Makamba	2	3	1	6
Bukirasazi	3	3	0	6
Gitega	3	1	0	4
Karuzi	2	3	2	7
Muramvya	2	0	0	2
Mwaro	3	0	1	4
Kirundo	3	8	2	13
Muyinga	3	4	2	9
Kayanza	3	10	1	14
Ngozi	3	5	1	9
Cankuzo	2	0	0	2
Rutana	2	3	0	5
Ruyigi	2	3	0	5
TOTALS:	43	46	11	100

Appendix II

THE JOURNEY TO SCHOOL IN LDCs

Schools, in common with other elements of social infrastructure, provide a service to their consumers - the school-age population. In order to use the service that is provided, students must normally travel from their home to school. It is therefore axiomatic that the schools are located where students have easy access to them. That access may need to be twice per day where the student goes home for a mid-day meal, or, more usually, once where the meal is either provided or the student provides his own. It may also be once per week or semester where accommodation is also provided at the school. The journey to school may be on foot, bicycle or by bus or private car, and these last two methods have become the exception rather than the rule in developed countries with advanced transportation systems. The journey to school is an important and widely recognized factor in educational planning, but so commonplace that relatively little systematic attention is ever given to it, except where it becomes central to a particular problem, as in the case of busing in the U.S.A. This relative neglect is even more evident for LDCs, yet it is in these countries, where there are currently large expansions in education in progress or being planned, that full appreciation of the structures and patterns of the journeys to school is necessary as a basis for rational planning. This appendix focuses upon the most familiar form of journey to school in LDCs - that of once per day on foot, from home to primary school and back again and discusses it in the general context of school location planning (SLP).

School location planning has two main objectives:

-- to enhance equality of educational opportunity by improving access to the school system as a whole or to individual schools; and

-- to enhance the efficiency of the educational system by improving the rate of utilization of facilities, and thereby reducing the per capita cost.

It may pursue these objectives separately or simultaneously in any one area, but where there is not universal primary or secondary education, as is general in LDCs, it is the former objective that is foremost. SLP has become a necessary, but not sufficient, component in the overall equity strategy in educational development since it identifies unserved or underserved areas, and provides the tools to allow planners to redress existing inequalities. At a regional scale SLP uses various indicators (e.g. enrollment rates, progression rates, pupil-teacher ratios) to identify areas where additional educational inputs are needed. At the local scale unserved school children are identified on the basis of the assumed or known catchment areas of existing schools and the population unserved by these catchments. The actual catchment areas are defined by the distribution of the homes of students attending a school. Thus the identification of homes and the linkages between home and school through the journey to school must be at the heart of SLP at this scale.

Appendix II

Planning to increase access through SLP rests on the assumption that where there is not universal or compulsory education the length of the journey to school is not infinitely variable, but severely constrained by the friction of distance - that the further the child lives from a school, the less likely he is to become a student in that school, that the proportion of children attending a school falls with distance from the school. Locations of schools should therefore reflect the distance decay function, and distances between schools ought to be minimized. Obviously there is a limit to which this is possible, for schools clearly cannot be provided at the door of every potential student.

Efficiency, on the other hand, as measured by costs per student will normally require relatively large schools and certainly in the case of primary schools, where teachers' salaries may account for 95% of recurrent costs, high pupil/teacher ratios. Large schools and high pupil/teacher ratios are proportionately more likely where there are large populations - i.e. in urban areas or in rural areas with high population densities. Efficiency can be enhanced at the expense of access. In practice, the distance from home to school and the spacing of schools must therefore represent a trade-off between the maximizing of access by having schools everywhere and the maximizing of efficiency by having schools that are sufficiently large to operate at a minimum per student cost. A central issue for educational planners is therefore to resolve this trade-off between access and efficiency.

A. Empirical Evidence on Journey to School [1]

The distance that children will be able to travel to school each day will obviously depend on two major factors - the age and physical capabilities of the child and the means of transport that is available to him. The older the child the more likely it is that he will be able (though not necessarily willing) to travel a longer distance within a reasonable time. Within a primary school there are typically children aged 5 or 6 years and up to 12 or 13 years of age, and there is a very wide range in their physical capability. This may be recognized formally in countries where school transport is provided, e.g. in Ireland where free transport to school is available for all children aged 4-10 who live more than two miles from the school, and for children aged over 10 years who live over three miles from the school. [2] Distances would be expected to be longer for upper primary grades than for lower primary grades in developing countries, even though there are no formal arrangements, such as were made in Ireland. One note of qualification may be introduced here, however. Not only are older children more able to walk longer distances, but they are also more able to work harder and better in the home or on the family farm. Since their economic contribution will be more evident, there may be some pressures for an inversion of the expected relationship between age of child and the length of his journey to school, for the longer is spent in travelling the less time there will be for that economic contribution before he goes to or returns from school.

The majority of students in LDCs have no choice but to walk to school. In Gharb, Morocco, a rural district, 95.6% of pupils in primary school came on foot, 3.3% by bicycle and 1.6% by public transport; 3/ in Bouira, Algeria, 95.8% in primary school and middle school came on foot, and this proportion was higher in those communes with the poorest road system. 4/ The catchment areas of five secondary schools studied in Costa Rica are relatively large, and while over 90% of those whose homes were within 5 km. of the schools did the journey on foot, over 95% of those from over 5 km. from the school came by public bus, school bus or private car. 5/ None came by bicycle. Even if it were financially possible to provide school transport in the form of buses attached to each school, it may well be impossible in practice in many LDCs to reach many of the potential students due to the lack of roads and the seasonal inadequacy due to rain and floods of some of the roads that do exist.

School location planning for rural schools in LDCs must assume that students will walk to school. The data on which this assumption may be based and on which it may be elaborated have been difficult to collect in practice, and until recently, assumptions about actual walking distances have generally been based on conventional wisdom rather than hard evidence. Conventional wisdom in this case, as in most cases, has tended to identify the exception and to assume it is the norm. Educators in LDCs know of individual instances of daily journeys of over 10 km., and have assumed such journeys are more frequent than they really are. Within the last few years, however, the case studies of the IIEP Research Project "Planning the Location of Schools" have been published, and eight of the nine case studies undertaken in LDCs contain data on the shape and area of school catchment areas. These data are not all directly comparable, as the distance intervals used are not at all standardized and in one case, Nepal, time of journey rather than distance was used as the measure, with the assumption that students in the first (grades I-III) and second (grades IV-VI) cycles of primary school covered one mile in 30 minutes. 6/ The particular problem of very rugged terrain in Nepal means that actual distances as measured on a map would mask more important factors affecting movement.

Some of the findings of the studies are summarized in Table 1. It links those data which are presented in metric and imperial distance categories and enumerates the proportion of students in various categories of schools coming from given distances or time bands. The case studies themselves provide more detailed descriptions, especially of variations within each study area, than can be presented in the table. The case study in Charoud, Iran, is omitted from the table as the evidence is not in a form that allows it to be tabulated and compared with the other data. However, it was shown that in this very sparsely populated area the great majority of students attend school in their own village. In only 15 schools were there students from neighboring villages. Most of these spent between 8 and 30 minutes on the journey, and the longest distance travelled was 5 km. 7/

TABLE 1 JOURNEY TO PRIMARY SCHOOL: PROPORTIONS AT A DISTANCE OR TIME PERIOD

<table>
<tr><th></th><th colspan="16">Distance</th></tr>
<tr><th>Kms.</th><th colspan="3">1</th><th colspan="3">2</th><th colspan="2">3</th><th colspan="2">4</th><th colspan="2">5</th><th>6</th><th colspan="2">7</th><th>8</th></tr>
<tr><th>Miles</th><th colspan="2">½</th><th colspan="3">1</th><th colspan="4">2</th><th colspan="2">3</th><th colspan="3">4</th><th colspan="2">5</th></tr>
<tr><th></th><th colspan="16">Time</th></tr>
<tr><th>Minutes</th><th colspan="2">15</th><th colspan="3">30</th><th colspan="2">45</th><th colspan="2">60</th><th>75</th><th>90</th><th colspan="3">123</th><th colspan="2"></th></tr>
<tr><td>Uganda – P1
– P6</td><td colspan="3">35.0
21.1</td><td colspan="3">28.6
21.1</td><td colspan="2">22.0
24.5</td><td colspan="2">10.9
17.1</td><td colspan="2">2.4
8.4</td><td>1.2
3.4</td><td colspan="2">0.7
1.0</td><td>–
0.3</td></tr>
<tr><td>Nepal – 1st Level</td><td colspan="2" rowspan="2">61.3
34.7</td><td colspan="3" rowspan="2">28.7
24.1</td><td colspan="2" rowspan="2">8.7
13.5</td><td colspan="2" rowspan="2">0.6
14.3</td><td colspan="7">0.7 →</td></tr>
<tr><td>– 2nd Level</td><td colspan="2">8.5</td><td colspan="3">4.9</td><td colspan="2"></td></tr>
<tr><td>Lebanon – Public
– Private</td><td colspan="6">95.3
90.5</td><td colspan="6">1.7
5.6</td><td colspan="3">0.5
1.4</td><td>2.4 →
2.6 →</td></tr>
<tr><td>Morocco – Primary</td><td>27.9</td><td colspan="5">43.5</td><td colspan="4">18.7</td><td colspan="3">7.8</td><td colspan="3">2.1 →</td></tr>
<tr><td>Costa Rica – Boys
– Girls</td><td colspan="4">83.1
86.1</td><td colspan="12">16.9 →
13.9 →</td></tr>
<tr><td>Ivory Coast – Sikensi[2]
– Dabakala[2]</td><td colspan="3">23.9
0.4</td><td colspan="3">29.0
11.6</td><td colspan="2">37.0
23.2</td><td colspan="2">2.2
22.8</td><td colspan="2">6.5
33.6</td><td colspan="4">1.5 →
8.0 →</td></tr>
<tr><td>Algeria – Primary</td><td colspan="6">81.0</td><td colspan="2">9.0</td><td colspan="2">4.5</td><td colspan="2">1.3</td><td colspan="4">4.0 →</td></tr>
</table>

1. It was assumed in the case of Nepal that it took children 30 minutes to travel one mile.
2. Comprising only those pupils who do not attend school in their home village.

→ Indicates an open-ended category.

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It is evident in all cases that the largest numbers of students came from within 2 km. of the school, the proportions ranging from 44% for P.6 students in Uganda to over 95% for public school students in Lebanon. Only in P.6 in the Uganda case study did more than 5% travel more than 5 km. Of course the distances and the proportions from each distance must be related to settlement patterns, and it is not surprising that those areas with highly nucleated settlement patterns, with the vast majority of people living in large villages (Morocco, Algeria, Lebanon, Iran), proportions coming from a short distance are much higher than is the case for that area of Uganda which has a highly dispersed settlement pattern with isolated homesteads rather than villages. Nevertheless, even in these circumstances very few students travel over 5 km. These data for Ankole District, Uganda, are to some extent misleading since the distribution of distances does overestimate the proportion of children coming from longer distances. These data were collected on the basis of the 1 km. grid square of the pupil's home, as recorded on 1:50,000 maps of the area, and a matrix of enrollments by each grid square was compiled for each school. The distances are not exactly grouped by linear measures since the grid squares had to be grouped. The net effect is that the area comprising the 0-1 km. category is smaller than the 1-2 km. category, which in its turn is smaller than the 2-3 km. category, and so on. Thus, when the proportions coming from given distances are related to the area to which they refer, and, in an area of highly dispersed population distribution, to the total population at these distances, there is a sharper and more regular distance decay function than the data in Table 1 suggest. Where there is a relatively even distribution of population within a catchment area the proportion attending school declines with distance from the school, but due to the difficulty of obtaining sufficiently disaggregated population data, this distance decay function cannot be quantified, even in this one case.

There are a few individual students who do travel much further than the others, and do not attend the school nearest their home. These longer journeys are normally attributable to:

(a) availability of transport. The importance of alternative methods of transport has already been discussed, and those children who do have a choice, and this may be less than 5% of total enrollment, may have the same journey times of those who walk, but cover much greater distances.

(b) social factors. Schools are not equally attractive in the eyes of parents and students, and the social basis of the schools origin and practice may be largely responsible. For reasons of the religious or denominational origin or the language of instruction one school may be more attractive than a school which is nearer. As a consequence of preferring a specific school to the nearest school the journey to school may be long. The "tail" in the distribution of distances for private schools in Zahlé, Lebanon, exists as a direct consequence of pupils exercising this choice and attending one of the schools of the various religious communities (6 Christian and 3 Moslem) which operate schools in the area. In Uganda, similarly, the denominational rivalry between the Church of Uganda (Protestant) and the Roman Catholic Church is the factor responsible for the 4.5% of the students in P.6 whose homes are more than 5 km. from the schools they attend. Most of these students do not attend the school nearest their home.

(c) academic quality. Children will be willing to walk further, other things being equal, to schools that are thought to offer a better education than the average. Schools are ranked by parents on the basis of prestige and achievements such as the number of children who find a place in secondary schools. Newer and smaller schools are generally less prestigious than old-established schools, and these older schools are able to attract students from a wider area than newer schools.

SLP in general assumes spatially optimizing behavior, that children attend their nearest school and that catchment areas will be discrete rather than overlapping. Of course socially based catchments or differences in school quality are very sensitive issues and present problems for educational planners in most LDCs, as they do in affluent societies. These overlapping catchments cannot be abandoned, very often for political reasons, indeed there may be good reason why they should not be, for they can offer a positive contribution to the learning situation as a whole. However, SLP must use distance minimization as its first premise, and plan accordingly. This need not mean the introduction of formally defined catchment areas, as in most developed countries, for this would normally prove impossibly unrealistic to plan and administer in LDCs. Should individual pupils wish, for whatever reason, to attend a school other than their nearest, there should in principle be no barriers to prevent this, though the educational system should not plan for such circumstances, nor should it be expected to bear the cost, e.g. of additional transport.

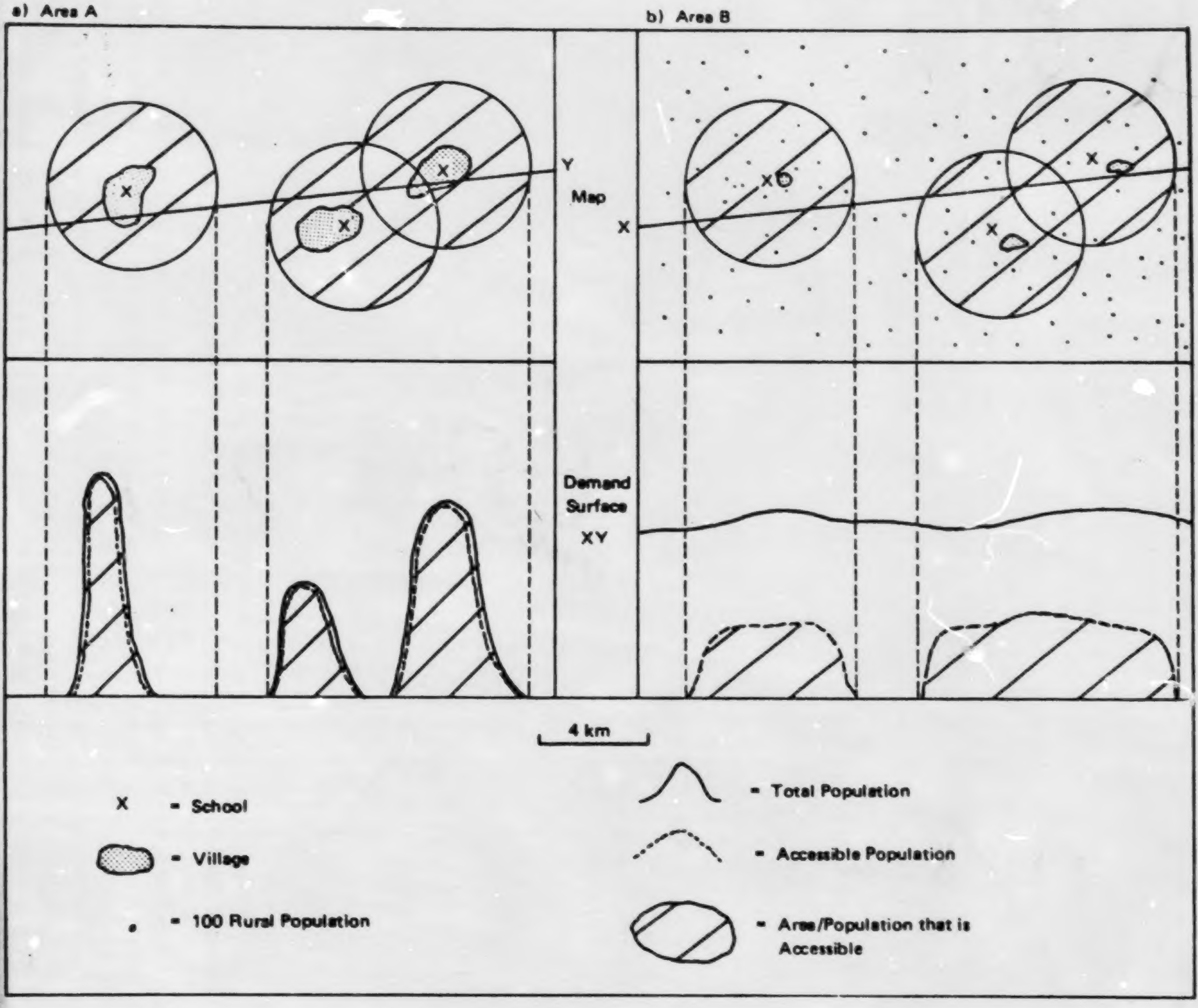
The spatially optimizing behavior of most primary school children is evident in the IIEP case studies. They do in general attend their nearest school, and the catchment areas that have arisen spontaneously show that very few are prepared to walk further than is necessary, though the length of the "tail" of the distribution of distances varies from study to study. The effective range, the distance from which the overwhelming majority of consumers travel daily, appears to be about 4 km. for a rural primary school. This distance must be used as a maximum planning norm, though it can be and often will be less than this. In Costa Rica the range was set at 1.5 km. for primary schools (and 5 km. for secondary schools). Where education is not universal there may be some slight friction of distance even within this range, but the observed shape of the distance decay function will reflect more the distribution of population than the distance decay function.

The planning implications of this fairly small range are considerable. Consider Areas A (Figure 1a) and B (Figure 1b). In both cases there are 10,000 people, but in Figure A they all live in three villages, and in B they are evenly distributed throughout. In the first case there is a highly peaked demand surface, and if there is a school in each of the three villages, then all the potential students live within the range, even though there are some unserved but uninhabited areas. If in B there are also three schools, located as in A, some students are being denied access because these areas remain unserved even though there are now people living there, but beyond the range of the schools. If in both cases only 50% of school children attend school, then the low enrollment rates in A may not be attributed to the spatial factor, but to a combination of social and economic circumstances. As the Nepal case study states: "because of the habitation pattern a very high proportion of pupils live close to the schools, and the participation rate is at least as much related to the attitudes in the home as to the shortcomings in either school network or the teaching conducted". 8/ In the second case the social and economic factors will still be present, but are complicated by the distance factor, both within and beyond the range of the existing schools.

Explicit attention must be given to the distance and range in planning the location and spacing of schools, but they are often ignored, or at best remain implicit. While distance data were collected and presented in the diagnosis in eight of the nine relevant case studies, they are not used as fully as they might have been in the analysis and formulation of a revised school map. Only one study specifically identifies unserved areas. The Costa Rica case, on the other hand, calls for and designs a system of satellite schools for first level (grades 1-3) feeding into central "nucleos" for the second level (grades 4-6). The plans involve the closure of some schools "if the distance between a school and its nearest neighboring school is less than 3.5 km. in an area of easy access, and if the anticipated enrollments are less than 50 students, and if the buildings are not in satisfactory condition". 9/ The remaining schools were therefore grouped into central/feeder systems based on a matrix of distances from each satellite to its "nucleo". There is no final table of distances from each satellite to its "nucleo", but the map illustrating the proposed structure certainly implies some distances of over 5 km. In any case, even if two schools are 3.5 km. apart, and each satellite school has a range set at 1.5 km., some children will be expected to travel 5 km. from the far side of the satellite's catchment area to the "nucleo". This compares very unfavorably with the theory and practice of nuclearization developed in Honduras and elsewhere in Latin America (Appendix I).

Distance affects not only initial access but can also affect the rate of drop-out. Where there is a split cycle or a feeder/central system as is proposed in Costa Rica many pupils who successfully complete one cycle may not progress to the next because the new school is simply too far off. Even

FIGURE 1 ACCESSIBILITY AND POPULATION DISTRIBUTION



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where there is no change of school, drop-outs have been shown to be systematically but weakly related to distance from home and school. Typically in drop-out studies one of the questions asked of drop-outs and their parents is "Why did you leave school?", and typically one of the main replies is "the school was too far". This may not necessarily be the most important reason, especially since the student did not find the distance too far when he began to go to school, but the discussion is never taken beyond the given answer into a consideration of what exactly is meant by "too far". Nor has there been any direct study of the apparent paradox of children finding distances too far when they are older, but attending school when they were younger and physically less well equipped to do the longer journey. The paradox may be partially explained in the higher opportunity cost for older children of economic activities on the farm, as previously discussed, in which case the familiar answer of the drop-out studies reflect a symptom rather than the cause itself.

B. Distance and Achievement

Once a child is in school the question arises whether the distance travelled on the journey to school affects his learning and achievement. Do pupils who walk over thirty minutes each day in each direction perform any less well than those who come from only five minutes away? The expected relationship would be that a child will be relatively tired after a long walk and therefore less likely to be able to devote as much attention as he might to the teacher. He will be more likely to be an absentee, especially when it rains, and if he is malnourished or sick the effort expended in the journey will compound the problem. Furthermore, with over one hour per day spent in travelling to school the time left for private study, if it is required, will be less than his peer who spends only a few minutes commuting.

The evidence to examine this hypothesis is weak. None of the IIEP case studies examined performance in any way. A study of factors affecting the achievement of grade 3 pupils in Thailand concluded that achievement was negatively but weakly correlated with distance to school. 10/ Heyneman, however, cites evidence from studies in Uganda and El Salvador that indicate that the relationship between mean achievement and distance travelled to school is in the opposite direction, that students travelling 5 km. in these countries performed better on tests than students travelling 2 km. 11/ Heyneman concludes from this evidence that distance does not in itself affect learning. An explanation for this apparent non-confirmation of the original hypothesis may lie in the scale of analysis. The studies cited by Heyneman assess a mean achievement figure of all children in a sample coming from the stated distance. Since those coming from longer distances are a small proportion of the total children at these distances they may be more highly selective of some characteristics, including socio-economic status and intelligence. Elsewhere Heyneman illustrates this principle. He finds that those areas of Uganda in his sample with the lowest overall enrollment rates tend to have the highest mean achievement scores, and shows that those children who do attend schools in the most impoverished backward and isolated areas are highly preselected. 12/ Recent evidence gathered by Super in Kenya substantiates this point. He shows that in an area of about 60% enrollment "both between and within families the 'smart' kids are sent to school". 13/ As a consequence, mean achievement scores may fall when enrollments are expanded, though individual scores would not necessarily be affected. Where mean enrollment rates are low, as would be the case beyond the range of a primary school, mean achievement scores of those few who do attend school will be high, but this relationship is independent of the distance factor.

Heyneman's data do show a sharp decline in mean achievement scores for those students who travel seven miles to school compared with those who travel five miles. If the pre-selectivity principle proposed above were to hold, then the scores would have been expected to increase further for this category. That they fell, may be interpreted as a distance effect, even on the highly selected students who attend from these distances. The very long journeys were having a depressing effect on individual performance. This evidence does imply that there may be some effect of distance on learning, but that the effect does not begin to show until the distance travelled is beyond the distance travelled by most students.

SLP, which seeks in the first instance to reduce mean travel distances, cannot be expected to have by itself major impact on learning. Mean achievement scores will probably fall where there is better access for more people, as less bright and less well motivated students are brought into the schools. There may be some indirect effect, for example by raising pupil-teacher ratios or through the effect of school size on achievement. Haddad has concluded that class-size in itself has little effect on achievement, but that the methods the teacher uses to teach whatever the number of the class is a crucial intervening variable. 14/ Similarly, the relationship between school size and achievement in LDCs is far from clear. In Thailand, for example, the national study of primary school achievement showed that there is a positive relationship between school size and achievement, but this is more a measure of the rural/urban differential in achievement, for the largest schools are in urban or semi-urban areas. 15/

We would agree with Heyneman's conclusion that "if a region already has universal schooling, then the shortening of the distance which the children have to travel will not necessarily improve the amount they learn". In regions where there is not universal education, however, and this is the norm in LDCs, the shortening of the distance by the provision of more schools of equal quality may improve the performance of some children who have had to walk very long distances, and will inevitably improve the performance of those who were previously denied access.

C. Planning Implications

In rural areas of LDCs, SLP is used primarily as a method of improving access to the education system. It is particularly valuable where planning seeks to implement universal primary education or even secondary education, for it will ensure that the universe is within the range. It is essentially part of an equity strategy, and is based on the fact that access is constrained by distance. In such a situation schools must be very close to the population they serve, and as few children as possible live beyond the range, as defined by walking distance. Given a range of 4 km., schools should not be more than 7 km. apart so that the whole area to be served is covered. Access will not then be a function of distance but other in and out of school variables. The range must be sensitive to the geography of the area, to barriers to movement such as streams or hills, and each individual catchment area ought to be examined in general terms in the process of an SLP exercise. Empirical studies of catchment areas need not be done for each school, but general range parameters and specific barriers to movement must be taken into account. This must be coupled with a good appreciation of the distribution of population in the area where the planning is being done. Educational planners need to look beyond their traditional data sources to maps and census reports for small areas.

Where education is already universal the primary function of SLP is normally to increase the internal efficiency of the system by reducing per capita costs through a better usage of existing facilities. This often involves consolidation and rationalization of schools, including the closure of some small schools especially as a response to population change. This function of school mapping is emphasized in the general synthesis of the IIEP project, and in the case studies undertaken in the more developed areas. In Costa Rica expected annual savings as a result of the proposed changes were estimated to be $52,000, and in Ireland there was a reduction in overall per student cost from £58 to £55 (5.2%). In both cases the savings would come as a consequence of closing some schools and raising pupil-teacher ratios, but were achieved at the cost of increasing mean distance to school. In Costa Rica there was no increased provision of transport to support these longer distances, and consolidation proceeded on the assumption that schools should be at most 3.5 km. apart, given that the vast majority of students would walk to school. In Ireland the benefits of consolidation seem much more clear for there is more elaborate and appropriate transport provision, and the costs of the increased transport needed to take children to school were included in the calculation of expected costs and benefits. The logical consequence of assuming that distance can be overcome if greater internal efficiency can be expected is to have one large school serving a large area, with pupil costs minimized and an elaborate transportation network provided. The reaction against this outcome in recent years has implied, through the resurgence of the neighborhood school, that "small is beautiful" not only in terms of size of school, but also in terms of length of journey to school.

The extent to which financial savings can be achieved by having larger schools in rural areas of LDCs is constrained essentially by the distance factor. The maximum distance that students may be expected to cover is fairly inelastic. Size of catchment areas must be assumed to be small, and since increasing access must have a priority over reducing per pupil cost, the cost per student will normally be higher in sparsely populated areas than elsewhere. In order to maintain the priority of increasing access some recognition of the desirability of regional cost variation should be recognized, such that a strategy of providing equal opportunity and equal distribution of all the inputs into the schools provides for higher per pupil costs in rural areas. Such a strategy is not premised on the requirement of achieving equality of results, but achieving equality of inputs.

D. Research Implications

Until the IIEP case studies were done little systematic attention had been given to the role of the distance factor in educational research in LDCs. This appendix had illustrated that there is still much to be learned about the length, frequency and effect of the journey to school, but possible studies have seemed to remain a low priority of educational research in the face of studies of the educational and economic efficiency of existing structures. A better integration of studies of the effect of distance with the main stream of research has been hampered by the methodological difficulty of different scales of analysis being required. Studies of drop-out and achievement are normally based on questionnaire and test data from a random sample of schools and of individual pupils within these schools. Scores and pupil data are then analysed through aggregate statistical techniques. This aggregate methodology can be inappropriate when one of the factors under consideration is distance. As was pointed out the mean journey to school may vary from school to school, but "better" schools will be more attractive and can be expected to have longer mean journeys than "poorer" schools, upsetting the expected relationship between distance and achievement at the aggregate. The questionnaire method also may be inappropriate to asking home-school distance questions for it is much more likely to be misrecorded than most other pupil characteristics. Accurate distance data require more laborious verification procedures. Developments in the study of the journey to school must take the individual catchment area as the basic unit of analysis and consider 100% coverage within that area (and surrounding areas where there are studies of non-enrollment).

At the scale of the individual catchment area as the unit of account four major areas for studies of the journey to school may be identified:

1. Distance and access. More evidence is needed on the shape of the distance decay function for different types of schools as a basis for planning the distribution and spacing of schools and their relationship to the settlement pattern.

2. Distance and drop-out. When and why does the distance factor affect the rate of drop-out? This is also relevant to the study of opportunity cost functions by age. To what extent does the journey to school, as a cost to be incurred for foregone economic activity, affect parents' perceptions of the value of sending children to school?

3. Distance and achievement. Within the catchment area and controlling for pre-selectivity, does achievement fall with the

length of the journey to school, and if so what is the shape of the distance/achievement function and how does it relate to the distance/attendance function?

4. School size, per capita cost and achievement. If it can be shown that the range norms can be revised downwards to raise individual achievement, and as a result there need to be more, smaller schools, how can teaching strategies (e.g. the development of multi-grading) be applied to the new situation and with what educational and cost effects? Alternatively can other modes of educational provision (e.g. distance learning techniques) be more effectively developed for pupils beyond the range?

Appendix II

Footnotes

1/ Most of the evidence is derived from the published case studies undertaken in connection with the IIEP research project on "Planning the Location of Schools". These are:

1. *Planning the location of schools: County Sligo, Ireland* by Jacques Hallak and James McCabe. Paris, Unesco: IIEP, 1973 (in English only).
2. *Méthode de préparation de la carte scolaire: Aurich, Basse-Saxe République féderale d'Allemagne* by Hans-Jurgen Back, Bernard Kirfel, Norbert Kulmsee and Reinhard Martinsen. Paris, Unesco: IIPE, 1974 (in French only).
3. *Planning the location of schools: Ankole District, Uganda* by W.T.S. Gould. Paris, Unesco: IIEP, 1973 (in English only).
4. *Planning and location of schools: the District of Kaski, Nepal* by James McCabe and N.R. Padhye, Paris, The Unesco Press, 1975 (in English only).
5. *Méthode de préparation de la carte scolaire: le caza de Zahlé, Liban* by E. Khoury, A. Chemaitelly, E. Wardini, K. Abou-Rjaili, M. Zaatari and H. Hajjar. Paris, IIPE, 1975 (in French only).
6. *Méthode de préparation de la carte scolaire: Le Charestan de Chahroud, Iran* by J. Hallak, K.R. Sohrab, F.G. Saghafi, A.A. Minaie and M.S. Sheikhestani. Paris, IIPE, 1975 (in French only).
7. *Méthode de préparation de la carte scolaire: Casablanca, le Gharb et Kénitra, Maroc*, by Guy Porte, Rene Boudet, Abdel Badou, Jacques Hallak, Rene Bernard and Jacques Poncharal. Paris, IIPE, 1976 (in French only).
8. *Método de preparación del mapa escolar: la Region de San Ramón, Costa Rica* by J. Hallak, F. Caillods, I. Brjeska and L. Secco. Paris, IIPE, 1976 (in Spanish: mimeographed French version also available).
9. *Méthode de préparation de la carte scolaire: les sous-préfectures de Sikensi et Dabakala, Cote-d'Ivoire* by J. Hallak, G. N'Guessan, A. Krizo and B. Duvieusart. Paris, IIPE, 1976 (in French only).
10. *Planning the location of schools: Sri Lanka* by Ananda W.P. Guruge in co-operation with K.D. Ariyadasa. Paris, IIEP, 1977 (in English only).
11. *Méthode de préparation de la carte scolaire: le daira de Bouira, Algérie* by K. Bensalah (in French only).
12. *Méthode de préparation de la carte scolaire: repartition des écoles d'enseignement generale en URSS* by V.A. Jamine, S.L. Konstaniane, K.G. Nojko, and V.N. Oussanov. (in French only: in preparation).

Footnotes (cont'd)

2/ IIEP Case Study 1, p. 23.

3/ IIEP Case Study 7, p. 105.

4/ IIEP Case Study 11, p. 29.

5/ IIEP Case Study 8, p. 47.

6/ IIEP Case Study 4, p. 24.

7/ IIEP Case Study 6, p. 49.

8/ IIEP Case Study 4, p. 66.

9/ IIEP Case Study 8, p. 89.

10/ National Education Commission (1976) A study of primary schooling in Thailand: factors affecting the scholastic achievement of the primary school pupils. Final Report, Prime Minister's Office, p. 28.

11/ Heyneman, S.P. (1978) Planning the equality of educational opportunity between regions. Unpublished paper prepared for an IIEP workshop on "Regional Disparities in Educational Development", Paris, December, 1978, pp. 41/42.

12/ Heyneman, S.P. (1977) "Relationships between primary school community and academic achievement in Uganda", Journal of the Developing Areas, 11(2), 245-59.

13/ Super, C.M. (1977) Who goes to school and what do they learn? Unpublished paper presented at Symposium of the Society for Research in Child Development, New Orleans.

14/ Haddad, W.D. (1978) Educational Effects of Class Size, Staff Working Paper, No. 280, World Bank.

15/ National Education Commission, op. cit., p. 54.

Appendix II

TRAINING PROGRAMS AND TECHNICAL ASSISTANCE

The formulation of a program of School Location Planning will require the acquisition of knowledge of and experience in the methodology of the planning technique. This can be achieved through the provision of training programs for local officials and/or the hiring of technical assistance specialists.

A. Training Programs

1. In-country: Training courses led by local or foreign experts, will be needed. These will be attended by officials at all levels of the planning hierarchy, beginning with a workshop for senior planners, during which overall objectives of SLP will be defined and a basic methodology developed. The first workshop is a decision-making forum rather than teaching forum, but one from which participants will lead subsequent courses for regional and provincial officials, with further, more localized courses until officials at all levels of the hierarchy are reached. A broad outline of the structure and content of such courses is given in the Guidelines, Table 4.

2. Abroad: This comprises a fellowship program with selected officials receiving specific training in SLP. This may be of two types:

   (a) Structured courses: The International Institute for Educational Planning (IIEP) has been responsible for several SLP courses since 1975. At first these were all at its Paris headquarters, but in 1977 the first of several regional courses was held in Indonesia for approximately 25 participants from the South East Asia region. About two courses per year, each lasting about three months, are currently planned in different parts of the world, and this pattern is likely to continue.

   (b) Visiting fellowships: These are less formally structured than training courses, and comprise at a minimum visits to one or more countries where there are SLP programs to familiarize officials with the practice and problems of the program and its implementation. Preferably, they include an element of on-the-job training with the fellow actively working along with local planners for some time. Such fellowships are normally one to six months in duration, and may be combined with other technique-specific training.

B. Technical Assistance

Technical assistance may be required to complement the training programs, and indeed to be involved in them. The assistance may be provided from local sources, especially for specific aspects of the program, and the resources of the local universities and research institutes (e.g. geographers or demographers) as well as specialists in other branches of Government service (e.g. cartographers in the Survey Department, demographers in the Census Office) should be utilized to the full.

More commonly, however, technical assistance for an SLP program as a whole is provided from foreign sources:

1. A resident expert on a contract for one or two years. This would be most appropriate in those countries where there is a shortage of planning cadres and where the need for SLP is considered to be fairly urgent. A resident expert should have had experience in a similar program elsewhere or should have been involved in training courses, as a teacher or participant. He should be placed within the Planning Unit of the Ministry of Education and should have a counterpart who would replace him when his contract expires. His work program would be similar to that scheduled in the Guidelines, Section D (see also Appendix IV).

2. Consultants on a short-term assignment, who would contribute at critical points in the program, i.e. during the initial formulation (associated with an initial workshop), during the field data collection, during the analysis of the data, and during the formulation of proposals for improving the existing system. It has been easier in practice to recruit suitably qualified consultants for two or three months at a time than to have a resident foreign expert, and in this case the responsibility for maintaining the program as a whole rests more evidently with local officials.

The principal sources of advice on and support of technical assistance personnel are:

1. UNESCO
7, place de Fontenoy
75700 Paris France

As the main source of international assistance in education, Unesco will provide personnel for SLP as it will in all other aspects of education.

2. IIEP
7-9, Rue Eugene Delacroix
Paris, 16, France

Through its teaching and practice in this field IIEP has access to a wide range of expertise. It does not supply specialists directly, but through Unesco, of which it is a special Institute.

3. Regional offices and specialist institutions of Unesco, of which specific mention may be made:

UNESCO Regional Office for Asia
Darakarn Building
920 Sukhumvit Road
P.O. Box 1425
Bangkok, 11, Thailand

UNESCO Regional Education Office for Africa
B.P. 3311
Dakar, Senegal

Centro Regional de Construcciones
para America Latina (CONESCAL)
A.D. 41-518
Mexico City 10, D.F., Mexico.

Each of these can provide staff for short missions (usually less than one month) in countries in their regions.

4. The World Bank
Education Department
1818 H Street, N.W.
Washington, D.C. 20433
USA

Projects financed through the World Bank may include specific provision for technical assistance for SLP, and Bank staff may be in a position to suggest appropriate names or organizations. In addition, during preparation, appraisal and supervision missions Bank staff may be able to provide specific assistance.

Appendix IV

SCHOOL LOCATION PLANNER - SAMPLE TERMS OF REFERENCE

General: A specialist is required to develop and coordinate capabilities in School Location Planning. He will be responsible for establishing procedures to enable the systematic planning of the location of educational facilities, both of new schools and additions to existing schools, as part of the everyday process of educational planning.

Contract: The contract is for (   ) months.

Qualifications and Experience: The specialist should have academic qualifications in Geography, Planning, Demography or a related discipline, and should have experience in educational planning.

Tasks: The principal task will be to develop and implement a methodology for School Location Planning in the country. This will involve the collection, where necessary, and analysis of three basic data sets:

a) Population data: derived from census reports and projections of the geographical distribution of school children at a target date.

b) Map data: the compilation of maps showing the distribution of educational facilities at various levels of the educational hierarchy.

c) Schools facilities inventory: the coordination of existing data and the collection of appropriate additional data to establish the current use, capacity and physical condition of existing school buildings.

Together these data will provide a base for planning the allocation of additional facilities to be provided in the Government's successive expansion plans. Analysis will consider inter-regional as well as intra-regional allocations, and will support the work of Education Officers in each region as well as providing an overall national monitoring system.

Organization: The School Location Planning specialist will be assigned as part of the Planning Division of the Ministry of Education. He/she will be expected to participate generally in the work of the Division, but will have the overall responsibility for the School Location Planning Program.

He/she will be supported by a team of junior staff. He/she will be responsible for training a counterpart during the period of the contract. He/she will also be expected to provide regular assistance to regional officials in their own regions throughout the country.

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